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Chicago, Ill., U. S. A.

The AUTOMOBILE

VOL. XXXV

NEW YORK—THURSDAY, OCTOBER 5, 1916—CHICAGO

No. 14

Fisk Capital Now \$39,500,000

Stockholders Vote To Add \$24,500,000 in Preferred and Common

CHICOPEE FALLS, MASS., Oct. 2—At a special meeting of the stockholders of the Fisk Rubber Co. here to-day it was voted to authorize an increase in the capital stock of the corporation from \$15,000,000 to \$39,500,000, adding \$24,500,000, divided as follows: \$7,500,000 first preferred convertible stock of which \$5,000,000 will be issued at once; \$5,000,000 second preferred of which \$2,500,000 will be issued and \$12,000,000 common stock which will remain in the treasury.

The additional issue of second preferred is being taken by the junior security holders, being offered to them on a basis of one share for every four shares of common and second preferred owned in the aggregate. The first preferred has been underwritten by a syndicate headed by Estabrook and Co. of Boston. The new cash is to be used for working capital.

Morse Succeeds Paul Smith

DETROIT, MICH., Oct. 3—E. C. Morse has been elected vice-president of the selling division of the Chalmers Motor Co., this city, succeeding Paul Smith, who died last July.

Mr. Morse resigns as sales manager of the Hudson Motor Car Co., this city. He will have charge of Chalmers sales service and advertising.

Offer \$1,500,000 Winton Preferred

CLEVELAND, OHIO, Oct. 4—Borton & Borton have purchased and will offer shortly to the public, \$1,500,000 7 per cent cumulative preferred stock of the Winton Co.

Although the Winton Co. is not disposed to change its policy of limited production, the company will devote the proceeds of this issue to expansion of the plant.

The company's balance sheet will show total assets of approximately \$300 for each share of preferred stock to be issued. Average earnings over the last 7 years have been at the rate of about four and a half times the preferred stock dividend requirements.

The company agrees to maintain net quick assets of 125 per cent of preferred stock issue. A sinking fund will be operative beginning 1919, which will retire the issue at the rate of \$75,000 annually. It will be redeemable at 105 and accrued dividends.

Warner Is Oakland President

PONTIAC, MICH., Sept. 29—F. W. Warner has been elected president of the Oakland Motor Car Co., succeeding C. W. Nash, who resigned some time ago. C. B. Voorhis, who has been its general sales manager, has been made vice-president of the company. Both Mr. Warner and Mr. Voorhis have been made members of the board of directors. Mr. Warner has been general manager of the company since June, 1915.

U. S. May Develop Gasoline Standard

WASHINGTON, D. C., Oct. 1—The price of gasoline may be regulated by the Federal Government as the result of an investigation now being conducted by the Department of Commerce which is trying to determine what is gasoline and what is not. It is hoped to arrive at a basis for fixing a standard for gasoline.

Young Is Dort Experimental Engineer

DETROIT, MICH., Oct. 3—M. S. Young has resigned his position as chief engineer of the Regal Motor Car Co. to accept the position of experimental engineer for the Dort Motor Car Co., Flint, Mich.

Paige 1916 Gain \$1,000,000

\$1,058,300 Cash on Hand—
Net Worth \$1,994,644—
Surplus \$994,644

DETROIT, MICH., Oct. 2—The Paige-Detroit Motor Car Co., this city, showed a net gain of \$1,072,152.35 for the year ending Aug. 31, 1916. The net worth of the company at the end of August, 1916, was \$1,994,644.79 and at the end of the same month in 1915 was \$922,492.44.

The company in its financial statement shows cash on hand and in banks amounting to \$1,058,300.66. Its surplus amounted to \$994,644.79 and its capital stock to \$1,000,000.

Paige Financial Statement Ending Aug. 31, 1916

ASSETS		
Cash on hand and in banks	\$1,058,300.66	
Municipal bonds (for investment)	47,463.45	
Accounts receivable	\$179,866.17	
Less reserve for bad debts	450.00	179,416.17
Store (manufacturing material)	1,150,976.03	
Less reserve for depreciation	13,500.00	1,137,476.03
Plant account	363,007.31	
Less reserve for depreciation	156,036.98	206,970.33
Prepaid expenses		24,685.14
Total assets		\$2,654,311.78

LIABILITIES	
Notes payable	\$150,000.00
Accounts payable	423,358.72
Accrued pay roll	29,343.77
Dividends	30,000.00
Dealers' deposits	26,964.50
Surplus	994,644.79
Capital stock	1,000,000.00
Total liabilities	\$2,654,311.78

Net worth August, 1916. \$1,994,644.79
Net worth August, 1915. 922,492.44

Gain in net worth...\$1,072,152.35

Hatch Perfection Spring Sales Manager

CLEVELAND, OHIO, Oct. 3—After 9 years of successful work in the sales department of the Perfection Spring Co., C. W. Hatch has been appointed sales manager.

21,660 Carloads in September

Gain of 2720 Over Shipments in 1915—Freight Car Shortage 14,000

CARLOAD SHIPMENTS OF AUTOMOBILES		
Month	1916	1915
January	18,054	8,369
February	21,502	11,273
March	28,600	16,442
April	28,000	17,112
May	24,000	13,642
June	23,879	15,325
July	18,079	12,517
August	18,254	16,959
September	21,660	18,940

NEW YORK CITY, Oct. 4.—At the regular meeting of the board of directors of the National Automobile Chamber of Commerce, Inc., held here to-day the traffic committee reported that shipments of automobiles and trucks during the month of September totaled 21,660 carloads, as compared with 18,940 in September, 1915, a gain of 2720 carloads.

The American Railway Assn. reported to the chamber that there is a shortage of 14,000 freight cars and automobile manufacturers are making strenuous efforts to induce their dealers to empty their cars promptly so that they can be put into use again with minimum delay. The patents, good roads, legislative, safety first and show committees reported and their reports were accepted.

Show Space Drawings

The directors' meeting to-day was preliminary to the meeting to-morrow when drawings for space at the national shows will be held.

Smith Form-A-Truck Takes License Under Cook Patent

NEW YORK CITY, Oct. 4.—The Smith Form-A-Truck Co., Chicago, has taken out a license from the Redden Motor Truck Co., this city, to manufacture converted trucks from touring cars, under the Cook patent, controlled by the Redden company. The Smith company has up to the present converted Ford touring cars into delivery vehicles, having as its patent in this work No. 1,147,131, granted to W. P. Wynne, July 20, 1915, and applied for June 29, 1914. The Redden company controls patent No. 1,180,475 granted to A. E. Cook and T. Van Tuyl, April 25, 1916. It was applied for under date of Dec. 17, 1910.

The Smith-Form-A-Truck Co. will continue manufacture of apparatus for converting Ford touring cars into delivery wagons as heretofore, but will do so by payment of royalty on the Cook patent. The contract between the Redden and Smith firms is apparently based on the validity of this patent. The Smith

Form-A-Truck Co. is one of the largest manufacturers of these truck-making attachments. It was in 1914, when A. D. Smith built his first truck attachment in Seattle, Wash. In May, 1915, the first one for the Chicago trade was manufactured. In August, 1915, the Smith-Form-A-Truck Co. established a Chicago plant and started the manufacture of these attachments on a large scale.

The scope of the Cook patent is well defined in some of the patent claims, No. 32 of which reads:

"The combination with an automobile of a pair of tractor wheels, a frame supported thereon and affording means to elevate the rear end of the automobile thereon, means on said frame for rigidly engaging the rear end of the automobile thereon, means supporting the front end of the frame on and securing the same to the front end of the automobile, and driving connections between the tractor wheels and the power plant of the automobile."

Madison Motors Co. Absorbs Old Company

ANDERSON, IND., Oct. 1.—The Madison Motors Co., with a capital of \$2,000,000, has been organized here to absorb the Madison Motor Co., formed in the spring of 1915 with a capital of \$500,000 to manufacture the Dolly Madison car. The new corporation will take over the local plants of the old company and will continue the present models on a larger scale of production.

Cecil Gibson, president of the old company, remains at the head of the new one. The board of directors will include C. D. Edinburg, general manager of the American Maize Products Co., New York City; W. F. Wickham, president of the Wickham Coal Co., St. Louis, Mo., and of the Wickham & Burton Coal Co., Chicago; P. P. Haynes, an attorney in Anderson; G. S. Sarber, formerly of Indianapolis and associated with Mr. Gibson in all his enterprises; and H. M. Caldwell, Evanston, Ill., capitalist and corporation attorney, who, it is said, is largely responsible for the new capital which goes into the company.

Perrin Resigns from Timken Axle

DETROIT, MICH., Oct. 1.—J. G. Perrin resigned to-day from the Timken-Detroit Axle Co. because of serious illness and other business plans.

Automobile Crank Shaft Corp. Formed

DETROIT, MICH., Oct. 4.—The Auto Crank Shaft Co. has sold its entire business and assets to the Automobile Crank Shaft Corp., recently incorporated under the laws of New York with a capital of \$1,000,000.

There will be no change in the officials of the company.

Columbia Motors Buys Argo

New Company Capitalized at \$500,000—To Make 3500 Electrics in 1917

DETROIT, MICH., Oct. 2.—The Argo Electric Vehicle Co., Saginaw, Mich., has been purchased by the Columbia Motors Co., this city. The Columbia Motors plans to begin the manufacture of its new car Jan. 1, 1917. This company is capitalized for \$500,000 and expects to produce approximately 3500 cars during the coming year at a price of about \$1,000. The first Columbia was produced early this summer, but further production was delayed pending the Argo purchase.

The new merger admits the Columbia Motors to a membership in the National Automobile Chamber of Commerce, and allows them to exhibit their product in the national automobile shows in New York and Chicago this next winter.

The officers of the Columbia Motors Co. include: J. G. Bayerline, president and general manager; A. T. O'Connor, secretary and treasurer; T. A. Bollinger, vice-president in charge of manufacturing; Walter L. Daly, sales manager; Ray Long, chief engineer; W. E. Metzger, vice-president, and John Mohrhardt, superintendent. All are members of the board of directors.

Standard Welding Makes Promotions

DETROIT, MICH., Oct. 4.—Following the resignation of H. A. Flagg, sales manager of the Standard Welding Co., and C. E. Miller from the management of the Detroit office of the same company. P. W. Gilbert, assistant sales manager for nearly 5 years, becomes sales manager; B. A. Quayle, in charge of the Chicago office for many years, and one of the company's first salesmen becomes general representative, with headquarters at the factory. B. G. L. Dodge, in charge of advertising and publicity for over 5 years, becomes manager of sales promotion.

W. C. Voss, formerly in charge of the Cleveland district, moves to Detroit, where he will assume charge jointly with Ted Palmer, long connected with the Michigan office. Willis Stutson, of the Indianapolis district, is placed in charge of the Chicago office with A. J. Brandt as assistant. Mr. Stutson will also handle the Indianapolis district from Chicago. O. L. Miller, formerly of the order department at the factory, replaces Mr. Voss at Cleveland. T. E. Hauser, formerly head of the order department, becomes assistant to the sales manager, while W. Paxton becomes head of the order department.

26,304 Reo Production in Year

23,753 Cars and 2551 Trucks—
Gross Sales Total
\$27,884,000

LANSING, MICH., Sept. 29—During its 1916 fiscal year the Reo Motor Car Co. delivered 23,753 passenger cars and the Reo Motor Truck Co. 2551 trucks. All told, 26,304 Reos were delivered to purchasers. The gross sales during the year totaled approximately \$24,363,000 for the car company and \$3,521,000 for the truck company, or a total of \$27,884,000 for all Reo sales. In the case of the passenger-car company the increase over the fiscal year 1915 is 33.08 per cent and the increase for the truck concern is 33.38 per cent, or an average increase of 33.24 per cent for all Reo business.

These are some of the facts which were brought out in the report submitted to stockholders who met this week with regard to the merger of the two Reo companies, which is now an accomplished fact. In the report it was further stated that at the close of the fiscal year 1915 the Reo Motor Truck Co. had capital stock issued and outstanding of \$937,250 and about \$250,000 surplus. The net earnings of the year were \$502,000. The Reo Motor Car Co. at that time had \$3,000,000 capital stock outstanding and \$3,662,000 surplus. Upon the present capitalization of \$6,000,000 the surplus would have been \$662,000 and the net earnings for the 10 months ended then were \$2,569,000. This, prorated by months, would show an earning of around \$3,000,000 for 12 months. Both corporations were earning at the rate of approximately 50 per cent of their present capital.

As a result of the merger it was de-

cided that the stock will be exchanged on a share-for-share basis, the holders of truck stock receiving 98,725 shares.

After having been delayed because building material was slow in being received, the Reo Motor Car Co., now having received a large supply, is rushing the completion of its new large machine shops. Part of the structures are three stories high, 407 ft. long by 175 ft.

Plans Clearing House

The Reo company is planning to establish a clearing-house division in its welfare department for the benefit of its employees. The object of the clearing house will be to help Reo employees having real estate or personal property in selling or buying and otherwise taking care of their property, and it will also do away with intermediaries.

To Export 2000 Harroun Cars Per Annum

NEW YORK, Sept. 28—A contract involving the exporting of 2000 Harroun cars per annum for 5 years and a total of \$5,000,000 was entered into to-day between the Harroun Motors Corp. and Speyer, Cole & Company in association with Graham & Co. of London, and Norton Lilly & Co. of New York is announced by John Guy Monihan, president Harroun Motors Corp.

The contract provides for the exclusive dealing in Harroun cars in England and the colonies except Canada. For 8 years these gentlemen have been the export dealers and managers for the Hupmobile company, which they continue to handle with the Harroun.

Tompkins in Ward Leonard Organization

MOUNT VERNON, N. Y., Oct. 2—William Miller Tompkins has been made Philadelphia representative of the Ward Leonard Electric Co., Mount Vernon, N. Y.

Aug. Exports Total \$10,068,538

5254 Cars Valued at \$3,574,485
and 1565 Trucks at
\$4,442,158

WASHINGTON, D. C., Oct. 2—Figures made public to-day by the Department of Commerce show that 6819 automobiles, valued at \$8,016,643, were exported in August last, as against 5453 cars, valued at \$7,509,027, shipped abroad during the same month of last year. The August exports this year were divided as follows: commercial cars, 1565, valued at \$4,442,158; passenger cars, 5254, valued at \$3,574,485; parts, not including engines and tires, \$2,051,895. During August of last year there were 1614 commercial cars, valued at \$4,387,193; and 3839 passenger cars, valued at \$3,121,834, exported, together with parts, not including engines and tires, to the value of \$2,038,321.

The big feature of the exports for the 8 months ended August, 1916, was the number of passenger cars exported, the number being 43,661, valued at \$29,472,228, as against 26,736 cars, valued at \$23,576,188, exported during the corresponding period of 1915. On the other hand, the exports of commercial cars dropped from 15,042, valued at \$41,886,961, during the 8 months of 1915 to 12,938 cars, valued at \$35,167,840, during the same period of this year. Exports of parts, not including engines and tires, increased from \$9,381,440 during the 8 months of last year, to \$15,227,161 during the same period of this year.

The large gain in our automobile export trade in recent years is indicated by the figures for the 8 months of 1914, during which time 509 commercial cars,

(Continued on page 592)

Exports of Automobiles, Truck and Parts for August and 8 Previous Months

	August		1916		8 Months Ending August		1916	
	1915		1916		1915		1916	
	Number	Value	Number	Value	Number	Value	Number	Value
Passenger cars								
Commercial cars	3,839	\$3,121,834	5,254	\$3,574,485	26,736	\$23,576,188	43,661	\$29,472,228
Parts, not including engines and tires	1,614	4,387,193	1,565	4,442,158	15,042	41,886,961	12,938	35,167,840
	5,453	\$9,547,348	6,819	\$10,068,538	41,778	\$74,744,589	56,599	\$79,867,229
By Countries								
Denmark	196	\$661,972	190	140,872	4,464	\$11,209,798	786	\$575,111
France	196	11,203	398	1,147,602	4	2,800	6,053	15,005,294
Germany	13	1,963,526	6	7,678	121	74,498	232	140,467
Italy	13	3,530,831	294	534,359	16,784	25,528,943	2,182	5,955,120
Russia	2,290	1,652,280	503	526,931	5,544	14,741,288	6,575	10,392,259
United Kingdom	722	480,677	860	750,361	4,682	3,673,203	2,854	3,634,840
Other Europe	721	9,100	31	32,427	69	65,406	366	340,648
Canada	368	193,725	417	314,611	2,072	1,110,173	3,797	2,439,481
Mexico	274	149,319	513	367,559	1,486	793,037	1,486	1,486
West Indies and Bermuda	145	86,470	145	86,470	1,486	793,037	1,486	1,486
South America	29	14,715	29	14,715	1,486	793,037	1,486	1,486
Argentina	151	85,355	151	85,355	1,486	793,037	1,486	1,486
Brazil	25	19,648	25	19,648	1,486	793,037	1,486	1,486
Chile	42	32,383	42	32,383	1,486	793,037	1,486	1,486
Venezuela	437	327,956	437	327,956	1,486	793,037	1,486	1,486
Other South America	513	367,559	513	367,559	1,486	793,037	1,486	1,486
Australia	2,760	2,368,736	2,760	2,368,736	1,486	793,037	1,486	1,486
British East Indies	391	322,689	1,241	1,443,344	2,508	4,703,181	6,076	7,430,398
British Oceania	330	393,771	748	220,846	1,284	1,192,086	3,399	2,022,345
Asia and Other Oceania	140	103,460	140	103,460	1,284	1,192,086	1,284	1,192,086
Other countries	5,453	\$7,509,027	6,819	\$8,016,643	41,778	\$65,463,149	56,599	\$64,640,068

BRAZIL

**Imports of U.S.A. Cars into Brazil are Increasing
But Should Grow Faster—Sao Paulo One of
Most Promising Centers for Cars and Trucks**

Part II

By David Beecroft

EDITOR'S NOTE:—This is the second of a series of articles embodying the close observations of automobile and general trade conditions in Brazil made by Mr. Beecroft, Directing Editor of THE AUTOMOBILE, during a 10-weeks' trip through Argentina, Uruguay and Southern Brazil as a delegate of the United States Government and member of the Argentine Return Visit Committee. Subsequent articles will further analyze the possibilities of selling cars, trucks, and tractors in the United States of Brazil.



Diagram showing the comparative areas of Brazil and the U. S. A.

THE area of the United States of Brazil as compared with that of the United States of America is brought out in the above map, in which Brazil has been placed over the U. S. A. Both, as stated last week, approximate the 3,000,000-square-mile area, but with vastly varying populations, Brazil with 25,000,000 and U. S. A. with 105,000,000. On an average the potential buying ability of the U. S. A. per 1000 of population is much higher than Brazil.

During the last 7 years Brazil, according to the figures of her own government, has imported 10,523 automobiles and trucks. This is an average of 1503 per year. The importation of automobiles into Brazil has been very irregular, there has not been any general trend of movement. There has been a pronounced anti-climax. Two years stand out conspicuously as strong years for Brazilian imports—1912 and 1913. The high water mark of imports was in 1912 when the total of 3785 was reached. The U. S. A. received about 20 per cent of that business. Germany got nearly 40 per cent.

The following year, 1913, was a strong year with 3218 cars imported, a little lower than the previous year, but still a fairly successful one. In that year we passed Germany, but remained behind France, which had been passed by Germany the year previous.

It was in 1914 that the bottom literally fell out of the Brazilian market and it has been out ever since, except for the developing business in the State of Sao Paulo. In 1914 importations dropped to 744 cars, scarcely one-fifth of what it had been the previous year.

1915 the Worst Year

But if 1914 was a solar plexus blow the figures of 1915 showed a still worse condition. The imports fell from 744 to the low level of 214. European business stopped, excepting fifteen cars from Italy, eight from Great Britain, ten from France and three from Switzerland. The U. S. A. got the lion's share, 169 cars out of 214, but even then our business declined as compared with the previous year.

In the last fiscal year ending June 30 our exports had risen to 258 cars, a good increase over the previous year, but still a small quantity as compared with 4444 cars sold to Argentina in the same period. The tabulation on the opposite page shows year by year an analysis of Brazilian imports from different countries.

These figures give some indication of the strength of both France and Germany in the Brazilian field, and account for the preponderance of French and German cars, not only in the capital, but in other leading Brazilian cities. The highest-priced French and German cars were sold in many of the leading cities such as Rio de Janeiro, Sao Paula, Santos, Porto Allegre, Manaos, Bahia, Pernambuco and Para. Great Britain was never a contender for the Brazilian trade in the sense of France or Germany. Italy was a much greater factor than Great Britain. Belgium and Switzerland were also striving for a slice of the Brazilian trade.

The distribution of cars throughout Brazil has been much more general than is supposed. Rio has been the big consuming center, but several other places were growing as car-consuming centers when they were overtaken by the war in 1914. That stopped their importing activities. The tabulations showing how many cars were received at the different ports of entry in Brazil was compiled from the official government figures obtained in Rio last June.

Brazil's Imports of Automobiles in the Past 6 Years

NUMBER OF CARS IMPORTED FROM DIFFERENT COUNTRIES

Country	1910	1911	1912	1913	1914	1915
Germany	172	315	1,060	613	114	3
Argentina	0	0	5	...	...	...
Austria-Hungary	0	1	1	...	...	...
Belgium	9	23	120	83	35	...
United States	95	301	783	814	213	169
France	280	511	1,011	953	186	10
Great Britain	37	133	205	112	46	8
Spain	1	0	5	...	...	...
Italy	67	189	432	412	92	15
Portugal	4	6	2	...	...	...
Sweden	27	0	0	...	...	...
Switzerland	43	93	136	142	11	3
Uruguay	0	2	24	...	...	...
Others	0	0	1	89	47	6
Total	735	1,574	3,785	3,218	744	214

Two horizontal columns in this table are of especial interest, that showing imports in Rio de Janeiro and the other showing imports into the Port of Santos. In 1910 Rio led Santos at a five-to-one rate; the next year the ratio was four-to-one; the next year two-to-one; and in 1913 the two ports were practically on an even keel with regard to imports.

Then in 1914 came the turning of the tables, Santos jumping ahead of Rio. The war had a more serious effect on Rio than the Santos trade. The cars imported into Santos were not used in the city, but shipped into the great state of Sao Paulo. The reason Sao Paulo was not hurt so much by the war as Rio was largely due to the coffee situation. Coffee has been well handled during the war days.

But the Sao Paulo business during war days has largely been with the farming classes in the coffee area. Cars are not selling very rapidly in the City of Sao Paulo, but quite rapidly in the country. The City of Sao Paulo is surrounded by a wonderful coffee area, which has kept trade alive.

The city of Rio has been less fortunate. It is surrounded

DISTRIBUTION OF AUTOMOBILES IMPORTED BY CITIES

Port	1910	1911	1912	1913	1914	1915
Manaos	32	31	29	24	5	0
Para	72	76	61	58	14	0
Maranhao	0	1	43	19	4	1
Ceara	4	6	36	11	4	0
Natal	1	1	1	0	0	0
Cabedello	2	3	0	0	0	0
Pernambuco	37	56	66	54	43	4
Maceio	0	3	3	18	2	4
Bahia	3	10	55	111	19	1
Victoria	0	4	0	0	0	0
Rio de Janeiro	468	994	2,117	1,345	198	8
Santos	97	296	1,121	1,318	325	166
Paranagua	0	0	21	31	0	1
S. Francisco	1	0	0	0	3	0
Joinville	1	0	0	0	0	0
Florianopolis	1	0	2	3	8	2
Rio Grande	3	19	12	14	2	1
Pelotas	1	25	30	45	25	4
Porto Allegre	9	40	151	87	37	2
Livramento	0	3	6	24	10	0
Quarahy	0	1	2	3	3	0
Uruguaiana	0	1	17	36	26	0
Itaquy	1	0	2	3	0	0
Jaguarao	0	0	4	0	0	0
Corumba	2	0	0	0	2	0
Porto Velho	0	4	6	6	0	0
Itajahy	0	0	0	2	2	0
Rio Grande do Sul	0	0	0	5	0	0
S. Borja	0	0	0	0	2	0

by mountains. It is shut in by hills around its celebrated harbor. The cars it imports it sells within the city. City sales have been literally dead for three seasons and so Rio's imports have been very low.

There are some other growing automobile centers in Brazil, as the tabulation will show. Porto Allegre is one of these. It is a city of 150,000 inhabitants situated on the edge of a long bay, with business concentrated in one long street along the water front. From this avenue very steep streets radiate up into the residential section. The paved streets are in a deplorable condition, converting automobiling from a pleasure into a torture.



This is the Union passenger depot in the heart of the city of Sao Paulo. It shows the modern spirit of the city. The wide street is ideal for motor truck and motor car traffic. In the city are many other new streets of equal width, and while there are narrower streets in the business section of the city, the use of motor trucks is not hampered by them as much as might be imagined. While the city has not more than 500,000 population, it has a go-ahead spirit which is destined to make it one of the greatest in Brazil. It is destined to be the great distributing center for the entire state of Sao Paulo, and the enormous state of Matto Grosso, one of the largest states in Brazil. Sao Paulo is also developing as a distributing center for other adjacent states.

The business of Porto Allegre has always been overwhelmingly in the hands of Germans, this city being the center of that section of Southern Brazil in which you find entire German-speaking communities. Naturally the city cars are exclusively Benz, N.A.G., Mercedes, and other German makes. But within the last 2 years the Hinterland, the adjacent country, has absorbed nearly 200 Fords. Other U. S. A. makers have not got started here and when they establish themselves it will have to be for the country trade.

The entire total of automobiles in this section, which in addition to Porto Allegre includes Pelotas and Rio Grande do Sul, is from 600 to 800 cars. This total shows considerably more cars in the territory than the tabulation does, which is largely due to the sale of U. S. A. cars within the last season.

Other Important Ports

The other leading ports for automobile importations are Para, near the mouth of the Amazon River; Manaos, half way up the Amazon and the center of the rubber industry; Pernambuco, a seaport town, with a preponderant colored population; and Bahia, the old capital of Brazil and a city which for years was a rival of Rio de Janeiro.

Unfortunately, many of these ports will never be the automobile consuming centers that Sao Paulo is because they



This is one of the busy business streets of São Paulo and is an example of the Spanish type of city. The street is so narrow that one way traffic is a regulation. This makes it possible to make good speed with a motor truck or motor car. There are many streets in the heart of the city of equal width, but fortunately there are many much wider, so that the use of motor trucks is as favorable as in Boston

have not the white population and have not the fertile, well-cultivated lands. As in U. S. A. so in Brazil, the sale of motor cars will be heaviest in those agricultural sections where the man cultivating the soil is able to purchase a car.

There is, however, one respect in which Rio is a most important truck center for the entire United States of Brazil.

Being the federal capital, Rio has used the government for its own benefit and naturally to the disadvantage of other cities and the twenty states. In Brazil there is no free interchange of freight and merchandise among the twenty Brazilian states. If you ship from one state into another you must pay an export tax. To draw a parallel in U. S. A., suppose you are a manufacturer in Michigan and have to ship motor trucks into New York or Illinois; you would have to pay the state government of Michigan an export tax. This export tax is used by all of the states comprising the United States of Brazil as a source of revenue.

This situation gives Rio a position of peculiar importance in that there is no export tax on any goods shipped from the port of Rio into any of the twenty states of the country. This makes Rio the natural place to locate headquarters for Brazilian business, particularly if you purpose covering the entire country. With headquarters in Rio there is no tax for goods shipped to the State of São Paulo, or to such other states as Minas, Matto Grosso, Rio Grande do Sul, etc., etc.

There is still another way in which the City of Rio de Janeiro



Map of Brazil, showing location of cities which are heaviest importers of automobiles and motor trucks

has fortified itself as a truck center for the country, by use of government influences. From Rio radiate the nationally-controlled railroad lines which are the big distributing channels for much of the country. Further, the government steamboat lines which operate along the entire coast are worked to the advantage of Rio and the natural disadvantage of other ambitious Brazilian centers. Rio has built some solid foundation stones to guarantee her future as a business center for the entire country, as well as being permanently fortified as the political capital of the nation.

Now let us return to the State of Sao Paulo, the best motor truck market in Brazil to-day.

Coffee Plantations a Big Field

The coffee plantations of Brazil offer the greatest field in Brazil to-day for the use of U. S. A. motor trucks. Coffee planters have the reputation of being good spenders. That characteristic seems to have been in their blood before they became coffee planters. The coffee industry is largely in the hands of natives of the state rather than being controlled by foreign capital, as is so often the case with railroads, telephone system, telegraph system, water works, trolley lines and other utilities.

One of the great objections that will be raised to the more general use of motor trucks in the coffee industry will be the argument that horse labor is very cheap as compared with motor trucks. Many planters will be able to show in figures what it costs to haul the coffee by horse as compared with motor truck. All of this is quite true, but in spite of all these men have yet to learn of the many economies of motor trucks. They are not schooled in the better use of trucks. They merely look upon the truck as a substitute for horse labor. The grade of horse used in Brazil is very inferior to that in U. S. A. and undoubtedly the planters will not be slow to see that in the long run the motor truck is a good investment rather than being an expense or an experiment.

The motor truck is not new in the coffee districts, but it

is there in relatively small numbers. You see large French, English and German trucks. Generally large-capacity vehicles are used of 5 tons or higher. You frequently see these large trucks being overhauled in the garages of Sao Paulo.

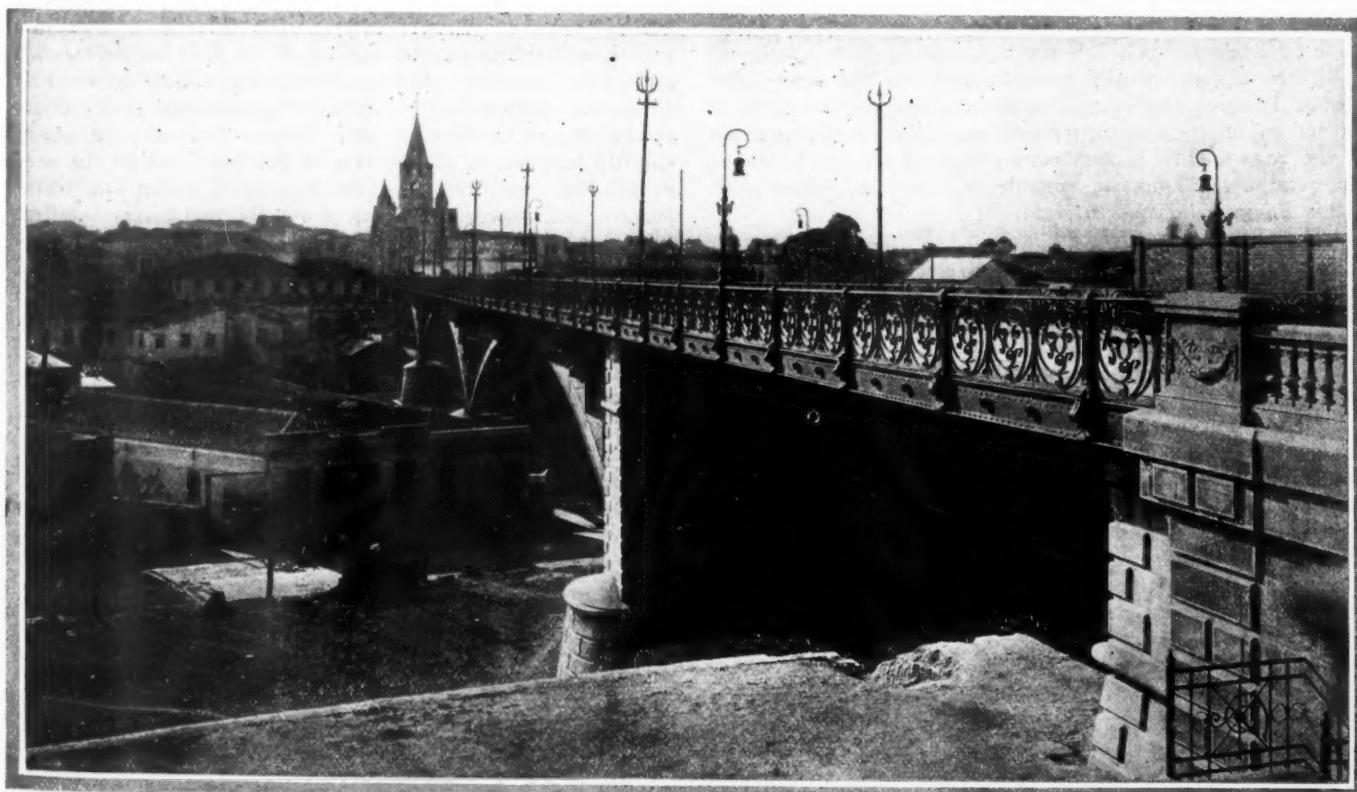
The lack of good roads will be advanced as a reason for not using motor trucks in the coffee areas. It is true that roads to-day are poor, but they are not too poor to admit of truck use. Roads are easily drained.

In the coffee country there is a distinctively wet and dry season. The wet season is the summer season when the growth takes place. In the dry season there is no difficulty with roads. We were through all parts of the state in the dry season and although roads were poor there were motor cars that were averaging 20 m.p.h. for distances of over 350 miles. Roads cannot be too bad when you make such averages.

Sao Paulo Best Truck Market

The best motor truck market in the United States of Brazil is in the State of Sao Paulo, which includes the majority of the great coffee area of Brazil and also includes the City of Sao Paulo, the Chicago of Brazil, and one of the best and most enterprising business cities in all of South America. To-day this area is a better truck market than the capital city of Rio de Janeiro, which has more than twice as many trucks in operation to-day as Sao Paulo city or the entire state. Rio is not an active truck market to-day, in fact, it is a very poor truck market. It is an over-supplied market. European makers stocked Rio 4 or 5 years ago. The city was oversold on trucks and there are to-day not a few Rio dealers who have large stocks of trucks on hand. One Rio dealer admits having over forty large trucks on hand, the majority of which he has had in stock for several years. He has sold over 250 trucks of his make in the city and is naturally quite burdened in carrying his present stock, which he has not been able to move for nearly three years.

(To be continued)



This large viaduct near the heart of the city of Sao Paulo is an example of the enterprising spirit of the city and is indicative of the general go-ahead spirit of the state of Sao Paulo. This viaduct carries double street car lines and is amply wide for all kinds of traffic in both directions. When you find a city adding street improvements of this nature you are certain it will be a profitable motor truck market.

Aitken Wins Astor Cup at 104.83



JOHN AITKEN
Photos by International Film Service

SHEEPSHEAD BAY MOTOR SPEEDWAY, Sept. 30—With the delicate mechanism of his slender blue Peugeot working like a watch throughout the 250 miles of the Astor Cup race, Johnny Aitken broke the world's record for the distance here to-day in 2:23:04.03 averaging 104.83 m.p.h., without a single stop at the pits. His performance was 3:20:67 faster than the best previous time on the Sheephead track, which was 2:26:24.7 made by Anderson in the Stutz last year.

Aitken was practically unchallenged for the race after Resta's Peugeot had succumbed to a broken intake valve at the 100-mile mark and Christiaens' speedy Sunbeam went out of the race with a broken connecting-rod on the following lap. Ralph DePalma was unable to repair a broken valve in his Peugeot in time to start.

Aitken drove a heady race, seeming to know just how far to force his car without straining it. His tires served him perfectly as is shown by his non-stop record for the race. Rickenbacher in the Maxwell, averaged 103.9 and Vail in the Hudson and LeCain's Delage both made over 97 m.p.h.

Ideal weather conditions prevailed, the day being almost identical with that on which the race was run last year. The crispness of autumn gave a tang of excitement and invigorating quality to the air. A snappy breeze drove light fleecy clouds across the blue sky and the bright sun furnished sufficient warmth to draw the sting from the atmosphere. The coolness of the day and the fact that heavy rains had fallen the day before had much to do with the small percentage of tire trouble during the race for the tires responded to these conditions by a greatly reduced tendency toward overheating.

40,000 Spectators

The stands were well filled when the thirty-one cars were lined up in rows of four for the start and streams of people were still crowding through the gates to swell the crowd to its total of 40,000. Most of those who came in automobiles were early and thousands of cars were parked within the inclosure, a goodly percentage being drawn up in the parking spaces within the oval.

In seven rows of four cars and with three in the eighth

Breaks World's Record for 250 Miles in Peugeot Without a Single Stop at the Pits—Rickenbacher Second in Maxwell—Vail's Hudson Third



By Donald McLeod Lay

Astor Cup Prize Winners

Car	Driver	Time	Miles	Per Hr.	Prize
Peugeot	Aitken	2:23:04.03	104.83	\$10,000	
Maxwell	Rickenbacher	2:24:19.54	103.90	5,000	
Hudson	Vail	2:34:01.00	97.4	2,500	
Delage	LeCain	2:34:42.21	97.0	1,600	
Mercer	Pullen	2:37:26.00	95.2	1,300	
Crawford	Klein	2:38:01.00	94.8	1,200	
Delage	Devigne	2:38:31.00	94.6	1,000	
Duesenberg	Mulford	2:42:02.38	92.3	900	
Hoskins Spec.	Hughes	2:42:56.15	92.1	800	
Duesenberg	Milton	2:45:36.90	90.6	700	

row the racers were sent off on the preliminary lap, crossing the line for a flying start at 2:31 with Christiaens' Sunbeam in the lead. The English mount of the Belgian driver was still in the van at the end of the first lap, closely followed by Resta and Aitken in their blue Peugeots, with Louis Chevrolet's Sunbeam close behind. These cars made a group slightly in advance of the rest of the field and as the race progressed they drew into the lead by a wider and wider margin, their speed averaging about 106 m.p.h., for the first few laps.

On the second lap Christiaens was still ahead but Resta had passed Aitken. On the fourth lap Chevrolet's terrific speed of 113 m.p.h. enabled him to forge to the front with



EDDIE RICKENBACHER
Second in Maxwell



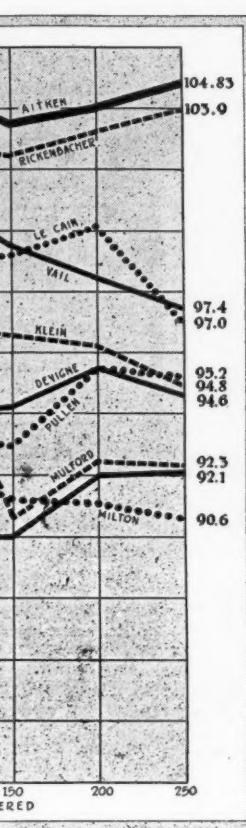
IRA VAIL
Third in Hudson

Resta second and Christiaens third. For 10 miles Chevrolet and Aitken battled side by side in as pretty a duel of speed as was ever seen on the Sheepshead speedway. The Sunbeam crossed the 20-mile mark a few seconds ahead of Aitken but on the thirteenth lap Chevrolet's car gave up the battle and went to the pits with a burned-out bearing which terminated the veteran driver's hopes of victory.

After Chevrolet was eliminated Aitken held the lead with Resta second, forcing him like a veritable Nemesis, and Christiaens third, burning to avenge the withdrawal of his teammate. At 30 miles Resta swept into the lead and the spectators sent up a ringing cheer as he passed Aitken but the order was reversed five laps later when Aitken again swung into front position, Christiaens still hanging to third with bulldog tenacity.

Passing Resta, Christiaens came into second place and for the next ten laps there was a thrilling struggle for supremacy between the dark, slender Peugeot of Aitken and the flashing nickel Sunbeam of the Belgian. At the thirtieth lap Aitken had only a small margin of lead which he increased slightly by the time the 70-mile mark was reached, the other cars maintaining the same position.

Back in the field most of the cars had been lapped by the three leaders before the fortieth lap was over and there were evidences that the tremendous pace was telling as car after car dropped out at the pits, until the 100-mile mark drew near only twenty-two of the thirty-one starters were still



Speed chart in miles per hour of the ten prize winners
in the Astor Cup race at 50-mile intervals

circling the echoing speed saucer.

One of the biggest thrills of the race came in the forty-ninth lap when Resta's car was seen to falter and slow down as it sped out of the homestretch into the bank. Occupants of the stands and the bleachers rose to their feet in one great wave, pointing toward the back stretch where the Peugeot had drawn up beside the inner railing. A babel of exclamations and excited inquiries broke out and swelled in volume as the red fire truck swayed across the rough ground of the infield followed by a stream of spectators in cars and on foot. It developed that a broken intake valve had put the quietus on Resta's hope that the bad fortune which has followed him on the Sheepshead speedway would not prevail this year. In stopping, a small blaze broke out which caused an alarm of fire but driver and mechanic quickly smothered it.

As the news that Resta was out of the race spread through the stands a new cause for excitement developed when it was seen that Christiaens' Sunbeam, then in second position and battling with Aitken for the lead, had slowed up and come to a

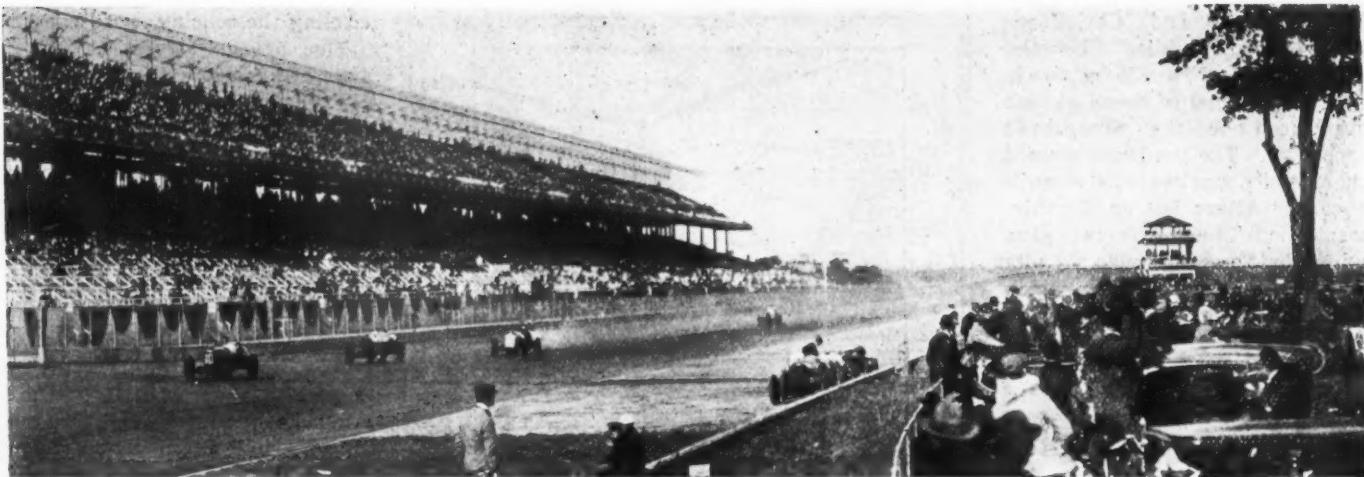
stop almost beside Resta's car on the very next lap of the track. A broken connecting-rod was responsible and after the other cars had made many laps the two unfortunates appeared around the bend leading to the homestretch pushed by drivers and mechanics in a mournful procession to the pits.

Aitken was now far in the lead and the only cars that seemed likely to challenge him for that position were the two

Time and Speed Every 50 Miles of Finishers in Astor Cup Race

Position	Car	Driver	50 MILES		100 MILES		150 MILES		200 MILES		250 MILES	
			Time	Miles per Hour								
1	Peugeot.....	Aitken.....	0:28:31.15	105.15	0:57:15.00	101.7	1:26:58.00	103.5	1:55:23.00	104.0	2:23:01.03	104.83
2	Maxwell.....	Rickenbacher..	0:29:15.00	102.6	0:58:19.00	102.9	1:27:49.00	102.4	1:56:19.00	103.2	2:24:19.54	103.90
3	Hudson.....	Vail.....	0:29:44.00	100.8	0:59:11.00	101.4	1:30:34.00	99.5	2:01:51.00	98.4	2:31:01.00	97.4
4	Delage.....	LeCain.....	0:30:34.00	98.2	1:00:34.00	99.1	1:30:53.00	99.2	1:59:52.00	100.1	2:31:42.21	97.0
5	Mercer.....	Pullen.....	0:35:51.00	83.7	1:04:25.00	93.2	1:36:48.00	92.9	2:05:43.00	95.5	2:37:26.00	95.2
6	Crawford.....	Klein.....	0:31:00.00	96.8	1:01:51.00	97.0	1:33:10.00	96.6	2:01:47.00	96.2	2:38:01.00	94.8
7	Delage.....	Devigne.....	0:32:19.00	92.9	1:03:53.00	93.9	1:35:31.00	94.2	2:05:40.00	95.5	2:38:31.00	94.6
8	Duesenberg....	Mulford.....	0:32:13.00	93.1	1:01:33.00	97.4	1:37:43.00	90.6	2:09:54.00	92.4	2:42:02.38	92.3
9	Hoskins.....	Hughes.....	0:30:04.00	99.8	1:06:41.00	90.0	1:39:59.00	90.0	2:10:22.00	92.0	2:42:56.15	92.1
10	Duesenberg....	Milton.....	0:32:40.00	91.8	1:04:58.00	92.4	1:38:46.00	91.2	2:11:48.00	91.1	2:45:36.90	90.6
11	Pugh*.....	Meyer.....	.....	.....	.....	.....	.....	.....	.....	.....	2:47:11.65	89.9
12	Adams*.....	Adams.....	.....	.....	.....	.....	.....	.....	.....	.....	2:55:06.07	85.8
13	Crawford*....	D'Alene.....	.....	.....	.....	.....	.....	.....	.....	.....	3:04:01.90	81.7
14	Ogren*.....	Burt.....	.....	.....	.....	.....	.....	.....	.....	.....	3:06:20.52	80.5

*Only finish times available.



A view down the homestretch of the Sheepshead Bay speedway during the Astor Cup race, showing the grandstand crowd and the front of the pits. The police and members of the technical committee kept this space clear

Maxwells, the Hudson and the Duesenberg, which were having many fascinating speed brushes on the turns and straightaways as they fought for the privilege of passing the Peugeot. Lewis' and Galvin's Premiers and Wilcox's Peugeot had been forced to give up the race because of burned-out bearings. A broken connecting-rod had disposed of Henning's Ogren and a leaking intake was responsible for the elimination of McBride's Olsen.

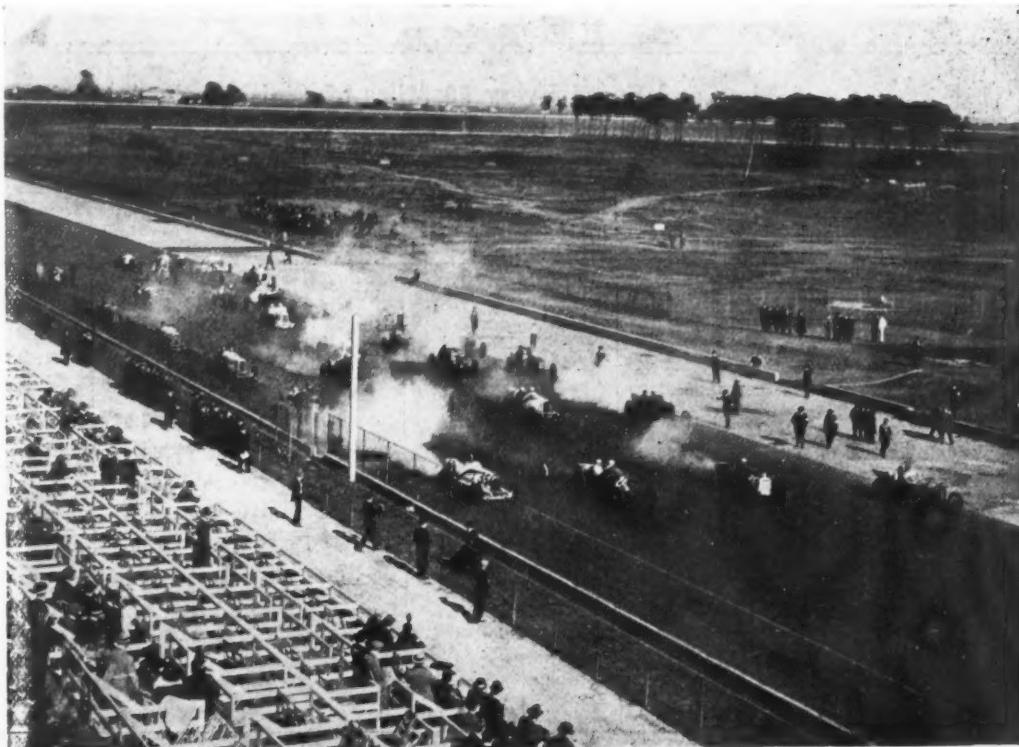
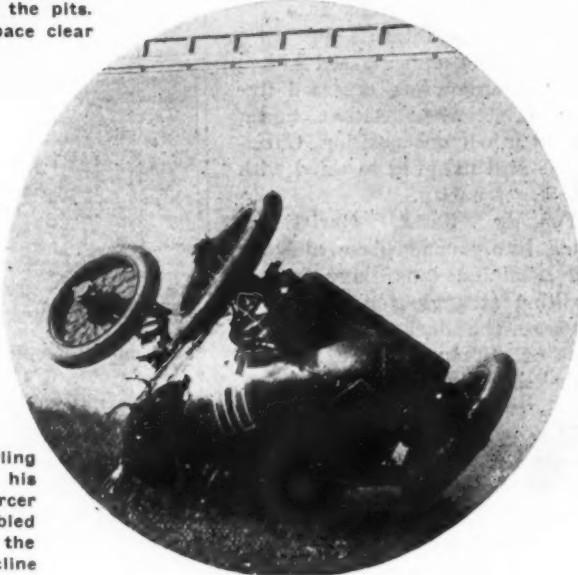
After the Sunbeam had been put out of the running Richenbacher and Henderson took second and third positions and alternated in this order for a good part of the balance of the race. Mulford's Duesenberg was leading Vail in the Hudson with Milton's Duesenberg trailing.

The only accident of the day occurred on the sixty-first lap when Ruckstell's Mercer blew a tire at the top of the bank on the turn running into the homestretch and tumbled to the bottom of the slope, with driver and mechanician trapped in the seat. Ambulances, physicians, race officials and the fire truck hurried to the spot where a cloud of dust surrounded the wrecked racer. A cheer of relief went up from the spectators, all of whom had risen to their feet as the yellow car hurtled across the track, when they saw Ruckstell and his mechanician, Quicksell, crawl from beneath the overturned machine and rise to their feet. The only injuries sustained, it developed, were a few bruises by Ruckstell and a sprained shoulder by his mechanician.

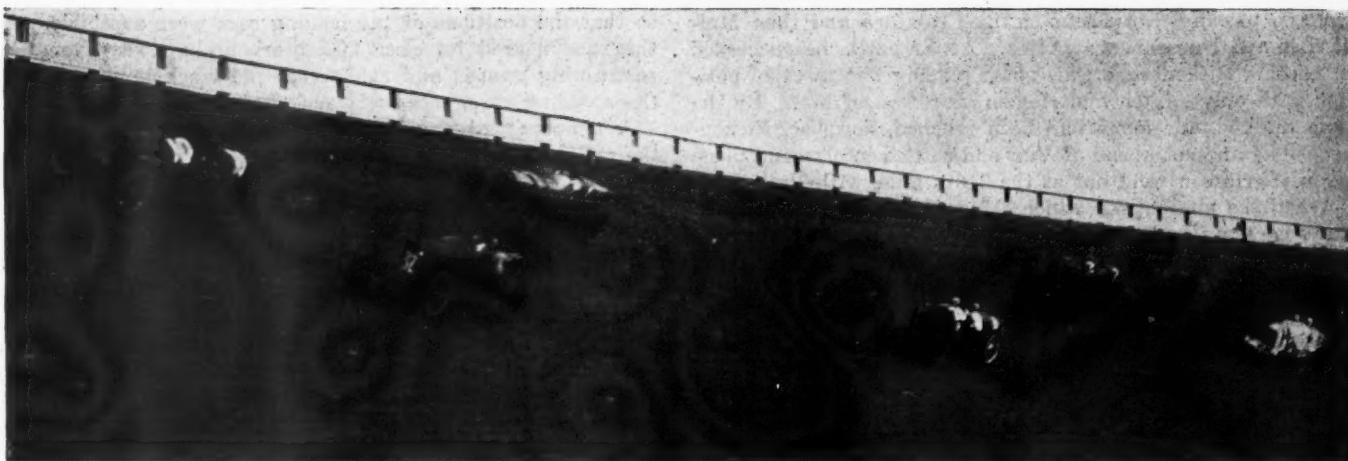
During this time Aitken had been increasing his lead, being nearly 2 min. ahead of the record for the distance at the 150-mile mark. Henderson's Maxwell was in second position at this stage of the race with Rickenbacher close behind fol-

Start of the Astor Cup race with thirty-one cars ready for the battle of speed. Note empty seats in stand, many spectators arriving late

Ruckstell crawling from beneath his overturned Mercer after it tumbled headlong down the steep, high incline



Photographs by International Film Service



A lively brush. The cars are, left to right, Aitken's Peugeot; Moore's Crawford; Christiaens' Sunbeam; Klein's Crawford; Resta's Peugeot, and Henderson's Maxwell. Speed is indicated by position on bank



Resta pushing his disabled Peugeot to the pits. Christiaens was close behind him with the silenced Sunbeam

lowed by Mulford, Klein in the Crawford, Vail in the Hudson and Milton's Duesenberg. This order continued lap after lap. At the end of the eighty-fifth lap Aitken had averaged 104.1 m.p.h., Henderson's Maxwell was still second but Milton's Duesenberg had taken the third position from Rickenbacher. It was now 4:15 and a number of the spectators, evidently considering the race won by Aitken, began to leave the stand. The great majority, however, continued to watch the speeding cars with intense interest.

At 200 miles Aitken had lifted his average speed to 105.75 m.p.h. Henderson was still second having covered 196 miles while Rickenbacher and Mulford were in the same lap. Milton was in fifth position at this point with Vail sixth, LeCain seventh and Pullen eighth. Aitken's time was 1:53:25.55 for the 200 miles or nearly 3 min. ahead of the record made in last year's Astor Cup race when the distance was negotiated in 1:56:21.40.

Henderson's Maxwell went out just after the 210th mile because of engine trouble, leaving Rickenbacher to overtake Aitken. This he tried in vain to do as the Peugeot driver was safely ensconced in first position and his car was running as smoothly as at the start of the race.

Vail in the Hudson did some sensational driving, during the 6 miles following the passing of the 150-mile mark, which probably enabled him to finish in third position. He had been close behind the leaders but apparently had not tried to maintain the high speed which had characterized them. At this point, however, he deliberately set out to win a place among the cars in the van. His Hudson shot forward as though suddenly unleashed and rapidly overhauled the cars between him and the



Aitken winning the 250-mile Astor Cup race after breaking the world's record for the distance. Note how the stand has filled up since the start

leaders, passing first Klein in the Crawford and then Mulford in the Duesenberg. After a bitter battle he succeeded in passing Rickenbacher, his spurt placing him in third position with only Aitken and Henderson ahead of him. By the time the 200-mile mark had been reached, however, Rickenbacher again shot ahead of Vail and settled into second place when Henderson went out at the 210th mile, with Vail third.

When the uncertainty which clouded the order of finish of the other cars had been cleared away, LeCain's Delage was found to be in fourth position with Pullen's Mercer fifth, Klein's Crawford sixth, Devigne's Delage seventh, Mulford's Duesenberg eighth, followed by Hughes' Hoskins, Milton's Duesenberg, Meyer's Pugh, Adams' Adams Special, D'Alene's Crawford and Burt's Ogren, in the order named.

Some difficulty was experienced with the scoreboard early in the race owing to the failure of the electrical apparatus but the board was put in partial operation later in the race

so that the positions of the leading cars were available. As the race neared its close spectators broke away from the restraining guards and ran across the track in the path of the speeding cars, seemingly reckless risk.

A temporary diversion, which, however, might have been the cause of an accident, occurred during the first 100 miles when a number of toy balloons were seen bouncing and floating along the track in front of the grandstand, threatening to fly into the faces of the speeding drivers. Starter Wagner darted onto the track during intervals between passing of the cars and captured the roving spheres, greatly to the amusement of the spectators.

Precautions against fire at the track were very thorough, many of the cars carrying J-M and Pyrene fire extinguishers, while in addition the H. W. Johns-Manville Co. stationed a squad of fifty men equipped with its extinguishers at various points around the track.

Pit Work a Minor Factor

THE limited amount of tire changing in the Astor Cup race did not permit of much comment on the training in this direction, as practically in all cases the change went through smoothly and did not occur at a vital period in the race. In locating the cause of trouble a little uncertainty could be noticed among the drivers where mechanical failures had occurred. For instance, where one of the cars had come into the pits with engine trouble the mechanic and driver labored for some time trying to start the engine after it could be seen that every revolution of the starting crank caused a puff of steam to jet from the radiator. This plainly showed that there was a breakdown between the cylinder and the water-jacket space and the case was hopeless, but still the driver and mechanic labored on.

Eight Broken Connecting-Rods

There were forty-five stops made at the pits. Of this number nine were permanent, and there were other cars which went out that did not reach the pits. Most notable of these were Resta and Christiaens who went out on the back-stretch almost simultaneously when running even and well up in the lead. Of the cars that went out, broken connecting-rods take the lead as a cause of trouble, eliminating eight.

Owing to the cool weather and the shorter distance tire troubles were comparatively few. Pullen in his Mercer car had more trouble in this direction than all the other thirty-one starters put together, as he changed five tires while no one else changed more than one, and in fact there were only three other tire changes, by Vail in the Hudson, Klein in the Crawford, and Gable, of the Erbes team. None of the tires were blown or thrown in this race, and there was a notable improvement in the manner in which the treads clung to the tire body as there was not one case of separation; whereas the principal cause of tire failure in the races of last year was the tearing off of the tread.

Oil Supply a Problem

The regulation of the oil supply continues to be the stumbling block for many drivers. Eleven times drivers drew up to the pits either to change or clean plugs. Adams, in the car bearing his own name, was the leader of the spark plug changers as he had three stops on this account. Carbureter adjustments were made by Mulford on the Deusenberg, on Chandler's Crawford and on the Ogren.

Probably the most interesting stop was made by Henning's Ogren for engine trouble, a careful inspection showed all the mechanism to be in good order. On cranking the engine, however, there was no suction through the carbureter and

finally a blow-hole was located in the intake manifold. This was sealed with shellac and tape but the temporary repair could not stand the vibration and heat and consequently the car had to be withdrawn.

PIT STOPS IN THE ASTOR CUP RACE

Car	Driver	Cause of Stop	Duration of Stop
Mercer.....	Pullen.....	Right front tire Change spark plugs Right rear, gas, oil Right front tire Right front, left rear, oil	20 sec. 4 min. 1 min. 15 sec. 35 sec. 1 min. 32 sec.
Hudson.....	Vail.....	Right rear tire	20 sec.
Duesenberg.....	Mulford.....	Broken air line Adjusting carbureter	9 min. 2 min.
Crawford.....	Klein.....	Right front, gas.....	1 min. 31 sec.
Crawford.....	Chandler.....	Adjusted carbureter Adjusted carbureter Repaired air line Repaired air line	30 sec. 2 min. 9 min. 1 min. 30 sec.
Mercer.....	Ruckstell.....	Paper from radiator Water, gas, spark plug	30 sec. 13 min.
Maxwell.....	Henderson.....	Out—broken rod	
Premier.....	Galvin.....	Out—broken rod	
Delage.....	LeCain.....	Inspections	55 sec.
Dans L'Argent.....	Muller.....	Change two plugs Clean plugs Out—broken rod	2 min. 4 min.
Peugeot.....	Wilcox.....	Out—broken rod	
Duesenberg.....	Buzane.....	Out—broken wristpin	
Premier.....	Lewis.....	Out—burned out rod	
Duesenberg.....	Devlin.....	Adjusted brakes and ignition Change plugs	5 min. 3 min.
Adams.....	Adams.....	Inspected plugs Change two plugs Change plugs	1 min. 2 min. 3 min.
Hoskins.....	Hughes.....	Trouble not determined	3 min.
Erbes.....	Gable.....	Slipping clutch Slipping clutch Consultation Plugs and inspection, gas, left rear	3 min. 5 min. 30 sec. 25 min.
Duluth.....	Rawlins.....	Engine inspection	Out of race
Crawford.....	Moore.....	Change plugs Change plugs Out—burned out rod	1 min. 6 min.
Ogren.....	Henning.....	Leaky manifold Out—leaky manifold	14 min.
Olsen.....	McBride.....	Out—burned out rod	
Olsen.....	Watson.....	Oil leak Change plugs, oil leak Change plugs	2 min. 11 min. 10 min.
Pugh.....	Meyer.....	Gasoline	1 min. 30 sec.
Ogren.....	Burt.....	Adjusted carbureter	2 min.

Preparedness Is Race's Lesson

Few Engineering Lessons Found in Analysis of Troubles —Many Old Causes of Failure Now Seem Conquered

AHIGH-SPEED racing car is always working just on the edge of failure. The reciprocating parts and the lubrication especially are liable to fail at any instant; the factor of safety is somewhere down in the decimal points. This being so the failure of a part like a valve or connecting-rod is not to be laid at the door of its designer; the explanation why one rod in four broke and not the other three is probably to be found in some trifling difference in the homogeneity of the steel.

In the Astor Cup race nothing new transpired that is of importance to engineers, the big, striking thing was the wonderful showing made by the tires. The engineering of the racing cars is just about what it was a year ago or more, the quality of the tires is ten times as good at least. Not only has their durability and sheer strength been increased, but their average of performance is much more nearly even. Loose treads seem a thing of the past. This means much for the ordinary car user in the ultimate analysis, for it means that we shall soon have tires at least twice as good as those we have to-day.

Importance of Being Ready

In the mechanical preparation for first class events there has been great improvement in the past 2 years, but there is still room for plenty more. The leading racing teams seldom lose a car except from the actual breaking of an important part. The lesser lights of the speedways usually retire by reason of something they could have prevented easily. If some part breaks it is perhaps ill luck, if some part comes loose it is surely carelessness and nothing else. The spark plug trouble has been cured entirely from the plug maker's viewpoint. It is rarely now that plugs fail except where they do so through too much oil reaching them. If they flood and

soot it means that the driver did not take proper precautions in setting his lubrication system.

The running of Vail's Hudson is a paramount example of what can be attained by *work*, by making sure of everything. Some of the cars built individually by their drivers are similar monuments to the genius expressible by the taking of infinite pains. On the other hand, a job hastily assembled will almost always give trouble and will seldom stay the course. To-day any good mechanic can build himself a racing car which will win prizes. He can buy stock engines which will give all the power necessary, he can get axles and frames which are suitable for the job. Such a car is not likely to win first place in an important event, but it can be sure of finishing at a good speed, if it is got ready carefully enough. To manufacture racing cars would be impossible; to build them calls for nothing more than patience and thoroughness in detail.

It is a pity that interest in a race centers so much around the winner. For really sporting competition the struggles between the men who take places from the fifth downwards are an enthralling spectacle to watch. There will always be comparatively few cars standing right at the top of the tree, but we could build any number that would make close seconds. At the present moment a car that will average 100 m.p.h. is difficult to create, but one which will average 95 is fairly easy to build. For every car in the 100 class we could have fifty in the 95 m.p.h. bunch.

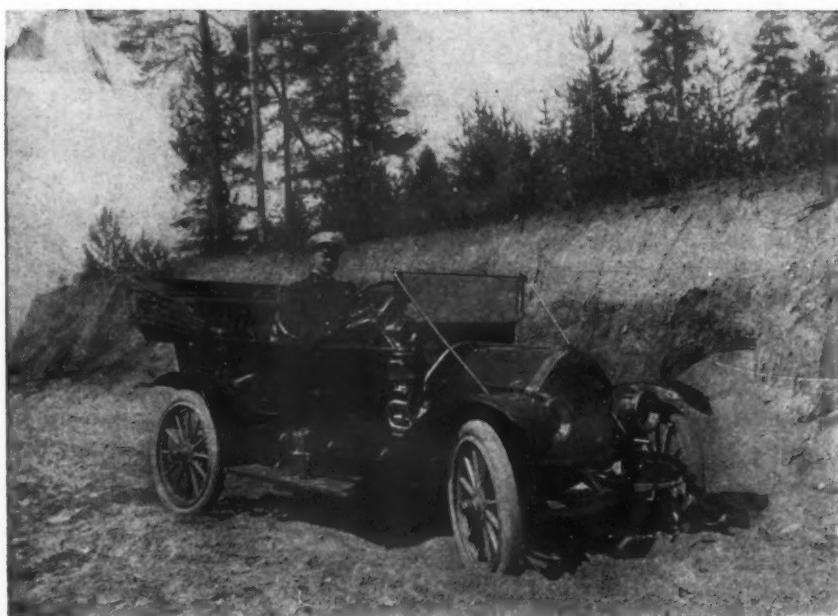
Of course it is always working upward. In a year or two we shall have the front rank cars averaging 115 miles or better, but by then the second rankers will have moved up a bit. If American speedway racing can be arranged so as to provoke keen contests between cars of approximately equal speed ability we could do without the front rank cars.

Specifications and Details of Equipment of Cars in the 250-Mile Astor Trophy Race

Car	Driver	Bore	Stroke	Disp.	Carb.	Igni-tion	Plugs	No. of Plugs	No. Valves	Valve Location	Tires	Wheel-base	Wheels	Pistons	Oil
Peugeot	Aitken	3.65	6.65	274	Zenith	Bosch	K L G	4	16	Head	Goodyear	105	R-W	Levett	Oilzum
Maxwell	Rickenbacher	3.75	6.75	298.2	Miller	Bosch	K L G	4	16	Head	Silvertown	106	Houk	Levett	Oilzum
Hudson*	Vail	3.50	5.00	288.6	Hudson	Deleo	Rajah	6	12	Side	Silvertown	104	R-W	Levett	Veedol
Delage	LeCain	3.63	6.75	286.0	Miller	Bosch	K L G	4	16	Head	Silvertown	106	R-W	Levett	Oilzum
Mercer	Pullen	3.87	6.37	300.7	Zenith	Bosch	Rajah	8	16	Head	Silvertown	108	R-W	Aluminum	Oilzum
Crawford	Klein	3.75	6.75	298.2	Miller	Bosch	Rajah	8	16	Hor. in head	Silvertown	106	R-W	Levett	Oilzum
Delage	Devigne	3.63	6.75	286.0	Miller	Bosch	K L G	4	16	Head	Silvertown	106	R-W	Alloynum	Oilzum
Duesenberg	Mulford	3.75	6.75	298.2	Miller	Bosch	Rajah	8	16	Head	Silvertown	106	R-W	Levett	Oilzum
Hoskins	Hughes	3.75	6.75	298.2	Miller	Bosch	Rajah	8	16	Hor. in head	Silvertown	105	R-W	Aluminum	Mobiloil
Duesenberg	Milton	3.75	6.75	298.2	Miller	Bosch	Rajah	8	16	Head	Silvertown	106	R-W	Levett	Oilzum
Pugh	Meyer	3.75	6.75	298.2	Master	Bosch	Rajah	8	8	Hor. in head	Silvertown	108	Houk	Aluminum	Oilzum
Adams Sp.	Adams	3.75	6.75	298.2	Master	Bosch	A. C.	8	16	Hor. in head	Silvertown	100	R-W	Aluminum	Oilzum
Crawford	D'Alene	3.75	6.75	298.2	Miller	Bosch	Rajah	8	16	Hor. in head	Silvertown	106	R-W	Levett	Oilzum
Ogren	Burt	3.75	6.75	298.2	Miller	Bosch	Rajah	8	8	Hor. in head	Silvertown	105	Houk	Levett	Castor
Dans L'Argent*	Muller	3.5	5.00	288.6	Hudson	Deleo	Rajah	6	12	Side	Silvertown	103	R-W	Cast Iron	Oilzum
Maxwell	Henderson	3.75	6.75	298.2	Miller	Bosch	K L G	4	16	Head	Silvertown	106	Houk	Levett	Oilzum
Sunbeam*	Chevrolet	3.28	6.14	294.2	Claudel	Bosch	K L G	6	24	Head	Silvertown	113	R-W	Levett	Castor
Sunbeam*	Christinaens	3.28	6.14	294.2	Miller	Bosch	K L G	6	24	Head	Silvertown	113	R-W	Levett	Castor
Duesenberg	Devlin	3.75	6.75	298.2	Miller	Bosch	Rajah	8	16	Hor. in head	Silvertown	106	R-W	Levett	Mobiloil
Duesenberg	Buzane	3.75	6.75	298.2	Miller	Bosch	Rajah	8	8	Hor. in head	Silvertown	104	R-W	Levett	Oilzum
Erbes	Gable	3.63	7.19	298.3	Miller	Bosch	K L G	4	16	Head	Silvertown	98	R-W	Alloynum	Castor
Crawford	Moore	3.75	6.75	298.2	Miller	Bosch	Rajah	8	16	Hor. in head	Silvertown	106	R-W	Levett	Oilzum
Mercer	Ruckstell	3.87	6.37	300.7	Zenith	Bosch	Rajah	8	16	Head	Silvertown	108	R-W	Aluminum	Oilzum
Peugeot	Reata	3.66	6.65	275.0	Miller	Bosch	K L G	4	16	Head	Silvertown	100	R-W	Levett	Oilzum
Ogren	Hennig	3.63	7.00	292.0	Miller	Bosch	Rajah	8	16	Head	Silvertown	106	Houk	Alloynum	Castor
Premier	Lewis	3.65	6.63	274.5	Miller	Bosch	K L G	4	16	Head	Goodyear	105	R-W	Levett	Oilzum
Premier	Gavin	3.65	6.63	274.5	Miller	Bosch	K L G	4	16	Head	Goodyear	105	R-W	Aluminum	Oilzum
Olsen	McBride	4.34	5.00	295.0	H & N	Bosch	Rajah	8	16	Hor. in head	Silvertown	108	R-W	Aluminum	Oilzum
Olsen	Watson	3.75	6.75	298.2	Miller	Bosch	Rajah	8	16	Head	Goodyear	108	R-W	Aluminum	Oilzum
Peugeot	Wilcox	3.65	6.65	274.0	Zenith	Bosch	K L G	4	16	Head	Goodyear	105	R-W	Levett	Oilzum
W. Duluth	Rawlings	3.75	6.75	298.2	Miller	Bosch	A. C.	8	16	Head	Silvertown	106	R-W	Levett	Mobiloil

NOTE—All cars four-cylinder, except those marked (*). All cars equipped with Hartford shock absorbers and Boyce Moto-Meter.

The Awakening of Russia



The author, Nicolas Kouznetzoff, at the wheel of the first Overland car to be brought to Russia. It was taken there in 1909. The illustration gives an idea of the quality of roads in Finland, these being generally bad, sandy and rocky.

EDITOR'S NOTE.—Nicolas Kouznetzoff, civil engineer, of Petrograd, and president of the Technical Committee of the Automobile Club of Petrograd, is on his second visit to the U. S. A., where he has been sent to investigate the farm tractor and motor truck industry. He was here less than a year ago on his first visit when he acquainted himself with the leading automobile factories and reported to his country on the development of the industry in the U. S. A. He has been closely connected with all of the engineering and sporting phases of the automobile industry in Russia.

ONE result of the European war upon Russia is that the country has already started to develop the manufacture of automobiles. Previous to the war little automobile manufacture was carried on in Russia, the majority of the machines coming from Germany, France, Italy and England, all of which concerns built colonial type models to meet the requirements of rough Russian roads. The war has demonstrated to Russia how necessary it is to have automobile factories, and five new factories have already been started, the government being largely responsible for this activity. According to government arrangements, these five factories must produce 7500 motor trucks and automobiles in a given time, this meaning a production of 1500 vehicles each. The minister of war has already placed orders with these five factories for all of this output.

The new car factories which have been started are as follows:

- Axaj Co., Rostov-on-Don.
- V. Lebedev Co. of Jaroslav.
- Russian Reno Co. of Rybinsk.
- Riabushinsky & Kouznetzoff Co. of Moscow.
- Russo-Baltic Car Works of Moscow.

The automobiles to be manufactured by these concerns will be almost entirely of Russian make, and only a few of the necessary parts not yet manufactured in Russia are permitted to be imported, for instance, magnetos, spark plugs, ball bearings. In order to enable the above mentioned factories to attend to their orders, a number of auxiliary plants are being established in Russia for the purpose of manufac-

Five Factories To Produce 7500 Cars and Trucks for Government — Roads and Car Markets

turing different automobile supplies. Every one of the above factories has adopted some foreign type of an automobile to be used as a model, with the exception of the Russo-Baltic Works, which are going to build their own type of an automobile, and which have been supplying the entire Russian market for a number of years with automobiles.

The Reno factory is going to build the French model.

Riabushinsky & Kouznetzoff are going to follow the Italian plan of Fiat.

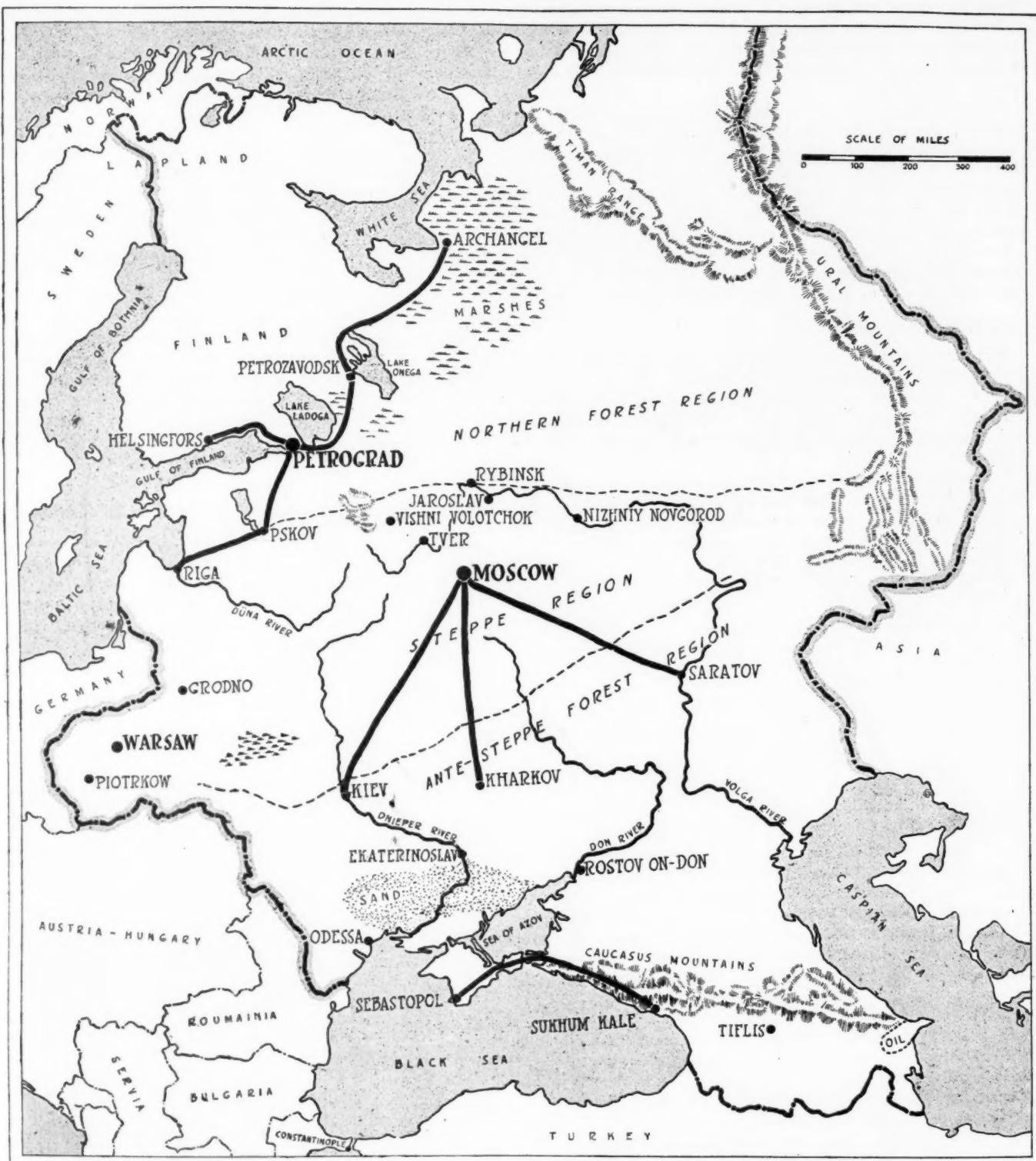
Lebedev is going to build after the drawings of the English works of Crossley.

The Axaj works have not decided as yet what they are going to manufacture. All of the works mentioned above are erecting their buildings at present, and some of them are already beginning to equip their factories. Some of the factories have sent their representatives to America, authorizing them



Upper—White touring car with special gasoline tank for war purposes. This car goes everywhere, being a flying car for all sorts of emergencies at the front.

Lower—Mobile tractor used by the Russian army in typical hauling service. It is drawing four heavy guns



Map of Russia in Europe, showing the cities which give most promise of some day becoming the leading automobile cities of the empire. The heavy lines radiating from Moscow and Petrograd indicate roads which are largely used for automobile travel at the present time. Another road connects Sebastopol and Sukhum Kale. Russia is a country of vast distances, huge forests and great plains, called steppes, large areas also being covered by impenetrable swamps. These conditions have been largely responsible for Russia's backwardness in automobile development.

to order and purchase the necessary equipment for the new factories to make production possible.

Central Part Is Best Field

Russia is a country of great distances, of great agricultural areas and great forest areas. That part most favored for automobile use is in the central vicinity surrounding Moscow and in the large agricultural areas extending in all directions from the south of Moscow. When you get within 200 miles

of the Black Sea the country becomes sandy and is not so favorable for motor car use.

Naturally, the cars will be used more in the large cities, which are at present well stocked with European models. Good roads radiate from the cities. From Petrograd to Moscow, 450 miles, the distance can be covered in 2 days easily. In a race it was covered in 9 hr. and 20 min., or 48 m.p.h. When touring it is customary to stop at the small town of Vishni Volotchok, which is a midway point. The country be-

tween Petrograd and Moscow is largely covered with forest.

From Petrograd to Helsingfors in Finland there is a good macadam road and the 275-mile trip can be made in 8 hr. Helsingfors has a population of 200,000 and about 3000 automobiles and trucks.

From Petrograd to Pskov, which is in the direction of Austria-Hungary, there is a good macadam road, making an 8-hr. trip between the two cities. From Pskov to Riga there is a good road. Riga was the home of the biggest Russian tire factory, Prowodnik, which soon after the outbreak of the war was moved to Moscow, where only recently the manufacture of tires has been commenced in the new factory.

Very recently an automobile test has been started from Petrograd to Archangel, the port on the White Sea. The road leads by way of Petrozavodsk on Lake Onega.

Good Roads from Moscow

More good automobile roads radiate from Moscow, which is centrally located, than from Petrograd. Leading to the south are good highways to Kiev, to Kharkov, and to Saratov.

That part of Russia lying to the north and east of Moscow is generally covered with great forests and the use of automobiles is very limited.

There are some good roads in the southern part of the country, one in particular leading from Sebastopol on the Crimea, the center of the Crimean war of 70 years ago, to the east. This road is very scenic and leads as far as Sukhum-kale on the eastern end of the Black Sea.

Perhaps the best roads in all of Russia are to be found in Poland, which is now in the hands of the Germans.

There will doubtless be a good market for motor cars among the wealthy farmers of Russia. The farming class roughly divides itself into large farmers, known as Pameshik, and the small farmer, known as Mujik, only a little over 12 per cent of the population being urban in European Russia. The former is a large landowner who can afford to buy several motor cars and many farm tractors. They have huge areas of land, some estates being as large as some of the smaller States in the U. S. A.

The Russian government has already realized the necessity of motor power on farms and has ordered twenty-three different makes of American farm tractors. These are the latest types and the Russian minister of agriculture has purchased them with the object of studying the tractor situation. Undoubtedly these will be the forerunner of large orders of U. S. A. tractors. It is not impossible to conceive the time when factories will be started in Russia under government stimulation to build farm tractors.

To Popularize Tractors

In order to popularize tractors with Russian farmers the Russian minister of agriculture is at present planning to form ten special tractor squads, whose duty will be to demonstrate tractors to Russian farmers in different sections. Each squad will have five tractors at his disposal. In order that these demonstrations may be successful and that the tractors will be well handled, the government is organizing special classes for teaching the mechanics of tractors. It is a part of the plan to purchase 300 tractors during the coming year.

Besides agricultural tractors the ministry of war is specially interested in all kinds of tractors used for the purpose of transporting artillery loads. During the present war the tractors have proved to be invaluable and have already replaced the work done by horses in a number of branches of industry.

For the last 2 years, due to the war, Russia, being an agricultural country, is suffering a shortage of laborers and especially horses for all kinds of agricultural work. The lack of horses and of the possibility of getting them 4 years ago raised the question of finding new methods of agricultural work. The only way out of the critical situation is the intro-

duction of tractors which will play an exceedingly important part as a substitute for horsepower.

There are about 20,000 miles of State road in Russia and approximately 475,000 miles of country road. The State roads are distributed among the various provinces as follows:

Province	Miles
Moscow	1500
Petrograd	1200
Warsaw	1100
Grodno	1000
Tiflis	1000
Ekaterinoslav	950
Volhynia	800
Piotrkow	700
Tavrichesky	650

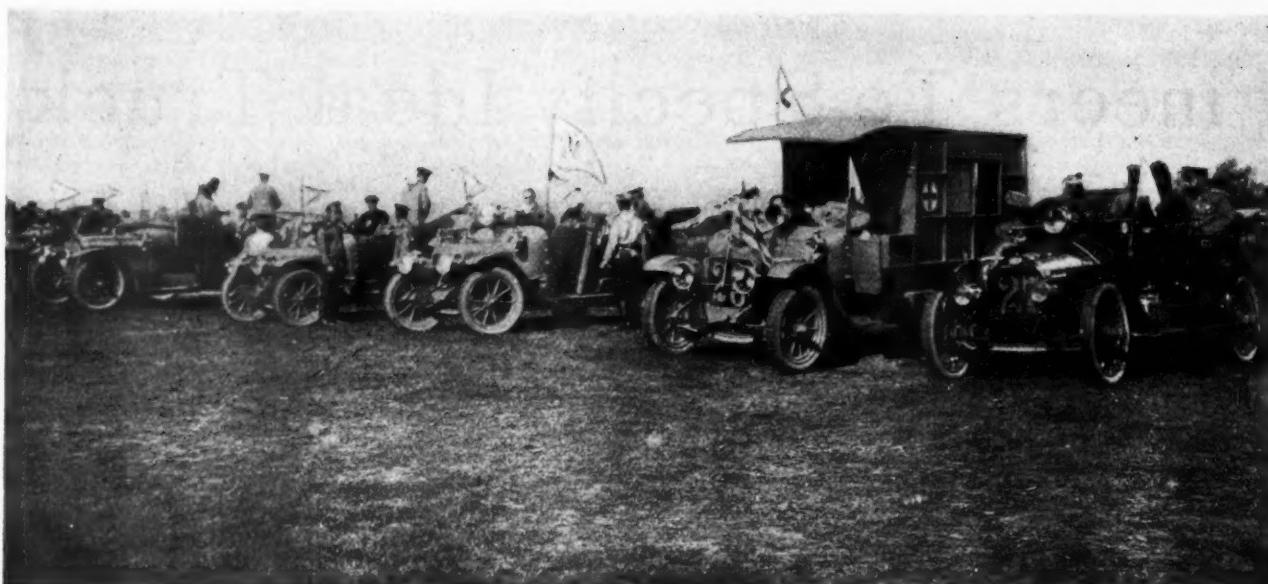
In all the other provinces combined there are less than 600 miles of State roads.

Russia produces annually 200,000 tons of gasoline and 1,400,000 tons of kerosene. Before the beginning of the war gasoline sold for 23 to 33 cents per gallon, depending upon the quality, but now the price ranges from 30 to 45 cents per gallon. Kerosene has also advanced in price 2 cents per gallon, selling at 10 cents now as compared with 8 cents at the time when Russia entered the war.

189,610 Cars Registered in 58 California Counties in 6 Months

SACRAMENTO, CAL., Sept. 30—Registration of 189,610 cars and 1254 automobile dealers has been reported for the first 6 months of 1916 by the fifty-eight counties of this State, including sixty-one non-resident cars. This is the first detailed report made by the counties. The statistics, including cars, motorcycles, chauffeurs and dealers, follow:

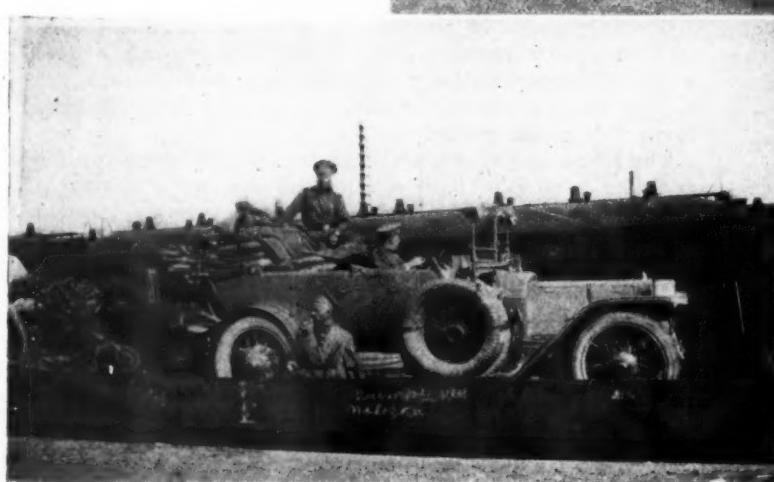
County	Cars	Motor- cycles	Chaussiers	Car Dealers
Alameda	13,311	1,948	547	60
Alpine	12	..	..	..
Amador	352	23	17	2
Butte	1,640	241	42	12
Calaveras	318	27	17	2
Colusa	638	77	49	8
Contra Costa	1,627	353	65	10
Del Norte	117	8	8	2
El Dorado	262	16	11	3
Fresno	7,466	1,352	136	42
Glenn	693	78	15	6
Humboldt	1,432	250	178	22
Imperial	2,262	115	102	15
Inyo	342	6	6	1
Kern	4,414	566	193	20
Kings	1,383	119	13	10
Lake	268	20	27	3
Lassen	307	16	11	1
Los Angeles	61,137	8,012	3,001	350
Madera	539	101	34	4
Marin	1,028	109	81	7
Mariposa	133	4	34	..
Mendocino	796	51	29	8
Merced	1,106	181	17	15
Modoc	302	13	18	5
Mono	17	..	1	..
Monterey	1,418	199	87	12
Napa	984	143	70	13
Nevada	396	33	13	1
Orange	5,410	917	129	35
Placer	759	79	42	6
Plumas	216	12	13	1
Riverside	3,251	706	111	23
Sacramento	5,372	819	350	32
San Benito	520	92	29	6
San Bernardino	5,215	1,114	192	43
San Diego	7,544	965	491	70
San Francisco	20,457	1,826	2,675	115
San Joaquin	4,494	849	131	34
San Luis Obispo	1,267	121	72	12
San Mateo	1,686	288	143	8
Santa Barbara	3,157	328	266	31
Santa Clara	6,186	1,227	183	40
Santa Cruz	1,404	182	42	20
Shasta	497	62	9	5
Sierra	80	4	7	2
Siskiyou	756	42	28	5
Solano	1,268	208	72	12
Sonoma	2,976	347	110	29
Stanislaus	2,965	447	52	25
Sutter	497	58	11	1
Tehama	641	121	17	..
Trinity	57	3	9	8
Tulare	3,780	602	42	26
Tuolumne	447	22	13	3
Ventura	2,098	184	57	17
Yolo	1,299	179	32	8
Yuba	550	64	35	3
Outside	61	6	2	..
Total	189,610	25,935	10,191	1,254



Above—A White Red Cross ambulance in the service of the Russian army drawn up in company with two White touring cars and several Opels used by officers. The White touring cars are to the left of the ambulance



Above—A line-up of automobiles requisitioned by the Russian army authorities for war service. They are a heterogeneous lot, comprising everything from light touring car chassis to heavy motor trucks. Most of them, however, are medium weight chassis. All have been fitted with army bodies



Above—A Delaunay-Belleville touring car mounted on a freight car on its way to the front for service with the Russian army

Right—An armored car which was one of several captured by the Russians from the Germans. Note the steel wheels and heavy armor plating, the latter protecting both rear wheels. A machine gun is carried in the revolving turret



Engineers To Specify Ideal Truck

S. A. E. Committee Drafting Specifications for Nominal 1½-Ton Truck Making for Ideal Without Regard to Current Practice of Manufacturers—Specification Will Be Submitted for Criticism to All Interested

By A. Ludlow Clayden
Chairman S. A. E. Standards Committee

HERE are two ways an army can buy trucks. One is to draft a specification which covers a few essentials but is not so rigid that it will not permit the purchase of existing trucks. This is good for war time or when there is a hurry call for vehicles.

The other, and the better way, is to get an ideal specification with close definition on everything that affects interchangeability and with latitude on non-essentials only. To say to the industry "this is what an army truck should be, and if you like to build a truck on these lines you will have no changes to make if an army order is out for bids."

This was done by Great Britain some years ago. A committee of engineers was appointed and they specified certain parts very accurately. Many different truck makers started building trucks which fitted the specification, trucks different in many respects yet as one in some vital points. War proved that the British scheme did not go far enough in some ways, and that some of the things insisted upon were not important. The scheme will be revised after the war. Meanwhile the S. A. E. through its truck standards division and its members generally is drafting a specification which might be entitled "the American engineers ideal army truck."

Ideal Army Truck

A recent meeting or two held to discuss an army specification showed that the building up of an ideal specification would be a long job. It also showed that a specification drawn so widely as to admit many standard trucks as now built was of little use. It was for this reason that the society took up the task of making an ideal specification. It is impossible to say to what use the specification may be put. It

may never be used or it may be used extensively. The immediate object of the society is to have the truck engineers of America go on record as to what they think an army truck should be. As to what parts of the design need rigid specification and what parts can be left to the individual manufacturer.

To get a start H. D. Church, chairman of the truck standards division and chief engineer of the truck department of the Packard Motor Car Co. drafted his idea of a specification; which is noteworthy in that many of its provisions call for things which are not Packard practice. This specification was, on Sept. 28, discussed by the truck standards committee and some changes were made here and there.

There are to be many more meetings. While the committee are working they will enlist the help of the whole industry. They will seek criticism and advice from any truck man who will study the specification carefully and write a letter or come to a meeting.

One thing is to be remembered above all others. Nobody who has begun work on this specification has any axe to grind. The specification will not fit any existing truck. If anyone wants ultimately to build one to fit it they will have to start from the ground up.

The following pages contain the specification as put up for criticism after the first meeting of the truck standards division. Before the society feel that agreement is close enough to call it a really ideal specification it will no doubt be altered in many respects from what it is now. *At present it is to be regarded only as a groundwork, as a foundation upon which the specification for the ideal army truck can be built.*

Tentative Standard Specifications for 1½-Ton Capacity Gasoline Military Motor Trucks

1. The number of trucks required will be stated in the "Instructions to Bidders," issued by the Purchasing Quartermaster. The prices quoted will be f.o.b. factory, and the truck must be complete in every respect, and in proper operating condition.

2. *Manufacturers:* Each bidder must submit a complete list of manufacturers and location of factories furnishing any part, either finished or unfinished, assembly, or accessory, which is used in the construction of the trucks, and not made in the factory where the trucks are constructed. This shall not be construed as including bar or sheet stock or structural material. If this information is not given, the proposal may be rejected, or in

case the proposal is accepted, the Quartermaster Corps reserves the right to name the manufacturer and select the material, apparatus, parts, or accessories, and no others will be substituted for those named.

3. *Employment of Convict Labor:* In the performance of work herein specified the contractor shall not, directly or indirectly, employ any person undergoing sentence of imprisonment at hard labor, which may have been imposed by a court of any State, territory, or municipality having jurisdiction, nor permit such employment of any person furnishing labor or material to said contractor in fulfillment of this agreement.

4. *Patents:* The contractor shall for

all time secure to the government the free and undisputed right to use any and all patented articles used in the work, and shall defend at his own expense any and all suits for infringement of any patent or patents, and in case of adverse claims under patents, the contractor shall pay all awards.

5. *Interchangeability of Parts:* All parts of trucks must be constructed to definite standard dimensions, and proper tolerances, so that any part of same may be replaced and properly fitted and adjusted without requiring additional tool work or machine work on the parts.

6. *Materials:* A complete list of all materials used in the construction of the various parts of the truck must be given,

together with the chemical composition, and physical properties of same.

7. Drawings and Data: Each bidder will be required to submit complete dimensioned detail and assembly drawings, showing the size and construction of every part of the truck. These drawings must show the shop limits on all parts, and a reference number or letter referred to the list of materials, physical properties, and heat treatment, which list will also be submitted with the proposal. The drawings must be arranged in proper order for filing, and provided with a suitable index which will enable any individual drawing to be readily located. The drawings and data above referred to will not be opened publicly with the proposals, but will be considered confidential. The drawings and data may be submitted direct to the Quartermaster General, Washington, D. C., and should be referred to in each proposal which is submitted.

8. If the drawings and data herein required are on file in the office of the Quartermaster General, they need not again be submitted with the proposal. If any major changes have been made in the construction of the truck, materials used, or methods of heat treatment since the drawings and data were submitted, details of those changes should be submitted with the proposal.

Service Station Data

9. Service Stations: Complete information regarding the location of all service stations, the floor area of each station, and the number of men employed in each service station, should be submitted with the proposal.

10. Departure from Specification Requirements: In case the vehicle on which proposal is submitted does not comply with these specifications, in every particular, the bidder must state definitely in what particulars the vehicle which he proposed to furnish does not comply with specification requirements.

11. Guarantee: Each bidder will be required to guarantee his vehicle or vehicles against defects in material or workmanship for a period of one year. This guarantee shall include the delivery of the defective part or parts to any point in the United States. After the installation of the new part, the defective part will be returned to the manufacturer if he so requests. The manufacturer will pay the transportation charges on all returned parts.

12. Load Capacity: The normal load capacity above the chassis, including body, shall be 4480 lb. The maximum load capacity above the chassis, including body, shall be 5080 lb.

14 M.P.H. Maximum Speed

13. Road Speed: The maximum road speed shall be 14 m.p.h., obtained by max-

imum motor piston speed on high gear of 1100 ft. per min., limited by governor.

14. Engine: Engine shall be located in front, under a hood, and shall be of the four-cylinder vertical type, with a piston displacement of not less than 300 cu. in.

Mechanically operated interchangeable poppet valves are to be used. Valve stems and springs are to be completely enclosed by dust and oil-proof covers which must be readily removable.

Crankshaft must have not less than three main bearings.

Circulating Lubrication

Lubrication must be circulatory, with at least 2 gal. capacity in the oil pan. There shall be pressure feed from the pump to the main crankshaft bearings. If splash is used for connecting-rod lower end bearings, it must be so controlled that the amount of lubrication is not affected by any grade up to 25 per cent, or by a certain transverse inclination. Spray lubrication for other parts of the engine will be acceptable. A screen shall be fitted on the inlet side of the oil pump of a design which will not require cleaning more often than once in each 1000 miles of vehicle operation. A screen must be provided between the crankcase oil-filler and the oil pan, and provision must be made to prevent its ready removal or intentional injury. A settling basin with drain must be provided in the oil pan, and the oil pump inlet must be above level of same.

Ignition by high tension magneto, with battery ignition for starting.

Magneton must be gear-driven, made to S. A. E. standards, and must be interchangeable in every respect, including mounting. Magneton must be arranged for clockwise rotation and be properly protected from water. For interchangeable magneto specifications see S. A. E. Data Sheet 36, Vol. I.

Timing Marked on Flywheel

To enable the timing of the valves and ignition to be readily set, the flywheel is to be clearly marked for the opening and closing of both inlet and exhaust valves, and for the magneto setting on full retard, and a suitable pointer is to be provided with which the flywheel marks can be aligned when timing the engine.

All ignition wiring must be protected from water and oil and mounted in such a way as to prevent chafing.

Engine must be mounted on a three-point suspension.

Oil pan must be removable without disturbing any of the main bearings or the clutch housing.

Carburetor must be so designed as to properly handle gasoline of the following specifications: (Not settled.) The carburetor must be provided with a readily removable wire mesh gauze strainer

in a sediment pocket under the float chamber, and sediment pocket must be provided with a drain cock of the snap-lock type.

Provision must be made to keep dust out of the carburetor air intakes, crankcase breather and oil filler.

Provision must be made to prevent oil leaks at any point in the engine.

To prevent mud and water being spattered up into the carburetor or ignition apparatus, some form of protection must be fitted between the sides of the crankcase and the frame, either in the form of cast webs on the crankcase, or rigidly mounted metal pans extending from the frame sides to the main barrel of the crankcase. Full engine shields extending clear across the frame will not be accepted.

15. Cooling System: Water cooling must be used, with forced circulation by centrifugal pump, which must be of a design to permit thermo-syphon circulation in event of pump failure.

Radiator must be of the vertical individually finned tube type, with detachable upper and lower tanks. All radiators must be interchangeable and constructed as per drawing. Radiators must be flexibly mounted, to prevent strains from any frame distortion.

Cooling Water Drain

A drain-cock which will drain all the water from the entire cooling system must be fitted in a location where a bucket can be readily placed directly beneath the drain. This drain-cock must have a clear bore of at least $\frac{1}{2}$ in., and must be fitted with a spring-snap lock to hold it in the closed position.

All suction hose connections must be provided with means to prevent collapsing.

Belt-driven fan shall be used, with a 28-deg. endless V belt of $1\frac{1}{4}$ in. width, and means of belt adjustment must be provided.

A radiator guard must be furnished, in accordance with drawing.

16. Hood: Hood with water-proof top must be fitted. Hood must be of a type which can be completely removed or opened up wide for engine inspection or adjustment.

Hood must be supported independently of the radiator.

Folding Starting Crank

17. Starting-Crank: Starting-crank must be arranged to fold up when not in use, in such a location that it will not be damaged by minor collisions. Detachable starting-cranks will not be accepted.

18. Clutch: Clutch must be of dry disk or dry plate type, with either a spring adjustment, or a spring sufficiently long to automatically compensate for wear on disk surfaces.

The steel clutch disks must be properly hardened.

All thrusts must be self-contained when clutch is engaged.

Clutch release must be fitted with ball bearings, with adequate provision for lubrication.

A large clutch brake must be fitted, and the entire clutch and release bearing must be enclosed in a dust-proof housing.

Plain clutch thrust-bearings will not be accepted.

19. Front Universal Joint Shaft: If universally jointed shaft is used between clutch and transmission, it must be equipped with two universal joints. Either the metal to metal or fabric disk type of joint will be accepted. In either type, provision must be made to prevent the shaft from whipping loose in event of joint failure. If the joints are of the metal to metal type, they must be thoroughly enclosed, and provision made to obtain lubricant.

Sliding Gear Transmission

20. Transmission: Transmission must be of the sliding gear type, with four speeds forward and one reverse, the various gear ratios to come within the following percentage limits:

High speed.....100%

Third speed.....}

Second speed.....}

Low speed.....}

Reverse: As low as or lower than low speed.

Transmission shaft pilot bearings must be either on ball or roller bearings, as plain bearings at this point will not be accepted.

Transmission must be so mounted as to be unaffected by chassis frame distortion.

Provision must be made to prevent oil leaks at any point.

Sufficient lubricant must be carried for 300 hr. operation without renewal or replenishment.

21. Propeller-Shaft: The propeller-shaft must be fitted with two universal joints and a slip joint. The fabric disk type of universal joint will not be acceptable.

Universal joints and slip joint must be completely enclosed, and provision must be made for retaining lubricant.

At the front end of the propeller-shaft, provision must be made to prevent shaft from whipping loose in event of failure of the front universal joint.

Hotchkiss Drive Banned

22. Connection Between Rear Axle and Frame: The driving connection between the rear axle and the frame may be of the type using radius-rods and torque-arm, or radius-rods only, with the springs taking the torque.

The Hotchkiss drive, transmitting both

torque and thrust through the rear springs, will not be accepted.

23. Rear Axle: The rear axle may be of the worm gear type, or a double reduction gear type with the reduction gearing in a central housing.

The rear axle design throughout must be such as to entirely house all the driving mechanism, and provision must be made to prevent any escape of lubricant.

Sufficient lubricant must be carried in the axle housing for 300 hr. of service without renewal or replenishment.

The differential must be of a type which will drive one rear wheel when the other wheel loses traction.

24. Front Axle: The front axle must be a steel forging.

Plain or ball bearings will not be acceptable for the front wheels.

Positive stops must be provided to limit maximum steering angle of front wheels, which must be sufficient to give a minimum turning radius, measured to outside of front wheel track, not to exceed 28 ft.

Steering-knuckle tie-rod must be located behind the front axle. (Many opinions wanted on this.)

25. Wheels: All wheels shall be of cast steel and interchangeable, although not necessarily identical as to design. Standardized dimensions which will be required are shown on drawing.

36 by 4 Tires

Wheels shall be of the proper size to take 36 by 4 in. single front tires and 36 by 4 in. dual rear tires.

26. Tires: Solid tires must be used—36 by 4 in. single front and 36 by 4 in. dual rear, S. A. E. standards, of makes either approved by or specified by the War Department.

27. Tread: Front, 56-57-in. center to center front tires. Rear, 56-57-in. center to center between dual rear tires.

28. Springs: Front and rear springs must be half-elliptic.

Springs shall be equipped with suitable rebound clips, and the second leaf from the top shall be wrapped around the spring eyes to give assistance to the top plate on rebound.

Springs with shrunk-on center bands will not be accepted.

Rubber or spring buffers must be fitted front and rear to cushion blow of frame on axle or spring center under maximum spring deflection.

11 to 13 Ft. Wheelbase

29. Wheel Base: Wheel base must not be less than 11 ft. nor more than 13 ft.

30. Frame Length: Frame length back of driver's seat available for body, 10 ft. 5 in.

31. Load Distribution: Load distribution arranged to carry between 80 and 95 per cent of load above chassis on the rear tires.

32. Control: Control levers, including gearshift lever, brake hand lever, clutch pedal, brake pedal, accelerator pedal and spark and throttle hand levers, must be in accord with S. A. E. standards.

Flanges must be fitted on the clutch and brake pedals to prevent the driver's feet from slipping off.

The pressure on the clutch pedal pad necessary to disengage the clutch should not be more than 90 lb. nor less than 70 lb.

33. Steering Gear: The steering gear may be of the screw and nut or the worm and wheel type.

The ratio of movement between the steering hand wheel and the front road wheels shall be such that for 360 deg. travel of the steering hand wheel, the road wheels will move not to exceed 30 deg. about the steering knuckle pivot. (Many opinions wanted on this.)

Throughout the steering gear, including all steering connection joints, adequate provision must be made for lubrication, and all steering connection joints must be protected by leather boots.

Electric Lighting

34. Electric Lighting Equipment: Current for electric lighting must be furnished from a 6-volt 100-amp. hr. storage battery and gear- or chain-driven generator on engine.

All wiring must be enclosed in metal conduits.

The following lamp equipment will be required:

Side-lamps—combination oil and electric, with 15 candlepower bulbs.

Tail-lamp—combination oil and electric, with 2 candlepower bulbs.

Side- and tail-lamps and side-lamp brackets must be interchangeable, as per drawing.

One swivel electric searchlight with 8 in. lens and 21 candlepower bulb, mounted on dash.

An electric instrument lamp with 2 candlepower bulb must be furnished, and also an 8 candlepower inspection lamp with 15 ft. removable socket cord.

35. Road Clearance: The following minimum road clearances must be maintained:

Under center of front axle, 9 1/4 in.

Under center of rear axle, 9 1/4 in.

Under flywheel housing or flywheel, 13 in.

36. Brakes: Two independent sets of double acting brakes must be equipped, either both or rear wheels or with one set on rear wheels and the other on transmission line back of transmission.

Brake Adjustments

Brake adjustments must be readily accessible, and must be adjustable without the use of wrenches or special tools.

All brake clevises, pins, connections and threaded joints must be subjected to

a rust-proofing process on their wearing surfaces.

The design must be such that the application of rear wheel brakes is not affected by relative movement between the frame and the axle.

37. Gasoline System: The gasoline tank must be made of drawn sheet steel with welded joints and thoroughly tinned inside and out. Soldered joints will not be acceptable.

Interchangeable Gasoline Tanks

Gasoline tanks must be of 30 gal. capacity and be interchangeable, as per drawing.

Tanks must be fitted with partitions to give two 5-gal. reserve compartments, and must be equipped with a two-way cock for the reserve compartments, combined with a shut-off outlet.

Gasoline tank must be located inside seat body, and mounting devices must be attached to seat body by means of bolts.

Pressure-feed of the gasoline is required, pressure to be supplied by engine driven pump arranged to maintain from 2 to 3 lb. pressure. An auxiliary fuel hand-pump is to be furnished, mounted on the dash. (Many opinions wanted on this.)

The fuel pipe from the tank to the carbureter is to be not less than $\frac{3}{8}$ in. outside diameter, and all fuel and pressure pipes are to be properly clipped at suitable intervals, to prevent vibration and chafing.

All fuel and pressure piping is to be of copper, thoroughly annealed.

All fuel and pressure pipe connections are to be S. A. E. standard fittings.

38. Driver's Seat: Dimensions of driver's seat shall be in accordance with drawing.

The seat cushion must be covered with genuine leather and be fitted with suitable cushion springs.

Arm rests and seat back must be covered with genuine leather and padded with genuine hair.

The distance between the back of the dash and front of the seat cushion on all trucks must be 25 in.

39. Dash and Floor Boards: Dash and floor boards must be approximately the same overall width as seat body.

40. Driver's Top: Cape or buggy type of top must be furnished, as per drawing, and covered with first-class 12 oz. water-proof canvas.

A suitable boot or storm apron must be furnished, made of 12 oz. water-proof canvas.

Road Sprags Required

41. Sprags: Road sprags must be fitted. These sprags must be of the triangular type and fitted with restraining chains and lifting device, as per drawing.

42. Towing Hooks: Towing hooks as

shown on drawing, must be attached by rivets or bolts to all four corners of the frame.

43. Body Holding-Down Devices: Chassis design must be such that body holding-down devices, as shown on drawing, can be used.

44. Paint: Chassis shall be supplied painted with three coats of lead and oil, olive drab color, of the following composition:

- 6 lb. white lead ground in linseed oil.
- 1 lb. raw umber.
- 1 pt. turpentine.
- $\frac{1}{2}$ pt. Japan drier.
- 1 qt. linseed oil.

Spare Parts

45. Spare Parts: The following spare parts must be furnished with each truck:

- 4 spark plugs with gaskets.
- 12 extra sparkplug gaskets.
- 3 exhaust valves.
- 3 valve springs.
- 2 fan belts.
- 1 assortment of cotter pins, containing not less than 1 doz. of each size used on truck.
- 1 assortment of lock washers containing 1 doz. washers of each size used on truck.
- 1 set of radiator hose clamps.
- 1 length each of all rubber water hose connections.
- 1 radiator drain cock.
- 1 box of plain hexagon nuts, to include not less than six of each size on truck.
- 1 box of assorted castellated hexagon nuts, to include not less than six of each size on truck.
- 1 box of valve grinding compound, to contain two grades.
- 1 roll, 1 ft. by 2 ft., of $\frac{1}{32}$ in. thick gasket material.
- 10 ft. secondary or high tension cable.
- 5 ft. primary or low tension cable.
- 1 metal box containing one set of electric light bulbs used.
- 1 box containing 1 set electric lighting system fuses.

Tool Requirements

46. Tools: Each truck must be furnished with the following tool equipment:

- 1 set of open end wrenches to fit all nuts on truck.
- 1 magneto wrench.
- 1 3 in. blade screw driver.
- 1 6 in. blade screw driver.
- 1 drop-forged all steel 12 in. adjustable wrench.
- 1 pair of 8 in. combination pliers.
- 1 valve lifting tool.
- 1 6 lb. pinch bar 42 in. long.
- 1 6 in. bastard file.
- 1 8 in. flat mill-cut file.
- 1 combination oil- and grease-gun with special tips to fit wheel hub, universal joints and other points requiring oil or grease in quantities.

1 socket-wrench for carburetor nozzle.
1 4000-lb. capacity jack and handle.
1 5-lb. can of soft cup grease.

47. Extra Oil and Water Supply: Each truck shall be equipped with a cylindrical drawn steel welded tank with two compartments, one to carry 2 gal. of engine lubricating oil, and the other to carry 8 gal. of water, as shown on drawing, tank to be thoroughly tinned inside and outside and to be fitted with two faucets having $\frac{1}{4}$ in. through hole, snap spring lock plugs with square ends for use of wrench. No faucet handles to be fitted. This tank must be permanently and rigidly attached to the chassis.

48. Tests: Any manufacturer's model of truck designed for military purposes must satisfactorily undergo the following tests, which will be conducted by the War Department. All tests hereinafter specified will be made under a load of 5080 lbs. above the chassis, distributed as specified in paragraph 31.

Ability and Economy

49. Ability: On hard roads of 25 to 40 lb. per ton resistance to tractive effort, the fully loaded truck must climb, on high gear, a 5 per cent grade, and on low gear, a 25 per cent grade. Under the same road conditions, the fully loaded truck must be able to start from a standstill in low gear on a 25 per cent grade.

50. Fuel and Oil Consumption: On level hard roads of 25 to 40 lb. per ton resistance to tractive effort, the fully loaded truck must average, on straight away running, 9 miles per gal. of gasoline, according to spec. in par. 14, and 200 miles per gal. of engine lubricating oil.

51. Cooling Ability: The cooling system must have capacity as follows: At sea level and in an atmospheric temperature of 80 deg. Fahr. and with an initial water temperature of 150 deg. Fahr. the cooling system must be adequate to permit the engine to operate under maximum torque developed at between 600 and 700 r. p. m. in low gear, for a period of thirty minutes before the cooling water reaches the boiling point.

52. Brake Performance: Each set of brakes must be powerful enough to slide the rear wheels in either direction on a hard road of 25 to 40 lbs. per ton resistance to tractive effort. At least one set of brakes must be capable of handling the fully loaded truck at a maximum speed of 14 m. p. h. on a descent of 4 miles, averaging 8 per cent grade, without firing the brake linings.

53. General Road Test: In addition to the above tests, all military models submitted will be required to undergo a 2000 mile road test, with regular enlisted drivers, carrying a maximum load of 5080 lb. above the chassis, over give and take roads, embodying severe operating conditions.

Early Armored Car Raids Audacious

Cars Taken from Transport Column and Fitted with Steel Plating Constituted First Types Used by British Army in France—Cover Retreats Well—Make Raids at Night

By Granville Pollock

EDITOR'S NOTE: For over a year Granville Pollock, of Buffalo, N. Y., was connected with an anti-aircraft corps on the western front in the present war. He had direct charge of the Pierce-Arrow trucks used to carry anti-aircraft guns, as well as other trucks needed for various uses in the corps. Mr. Pollock lived in an atmosphere surcharged with armored car matters and had a good opportunity to observe the practical working out of different types of armored cars, especially as used by the British army.

CONSIDERING the rapidity with which events followed one another at the commencement of the Great War, it was only to be expected that many small actions and incidents would occur that, due to the general excitement prevalent almost everywhere at the time, would pass unnoticed, or at least be quickly forgotten.

Yet some of these side issues, so to speak, had a most important influence on the whole military situation, though their full value will in all probability not appear until the end of the war, when the records of both sides may permit of a comparison of values.

In particular does this apply to the events in the north-western part of Belgium and that part of France known as Flanders, following the fall of Antwerp and up to the Battle of the Yser. For in this short space of time, the actions of a few daring individuals led by an extraordinarily bold and resourceful commander, did more to keep that part of the country and the channel ports clear of the Uhlan patrols and other German detachments than is generally known, or shown in military records; and incidentally, the first occasion on which British forces had used armored cars in Europe.

Fight Way Out of Antwerp

It is usually recalled that Great Britain assisted in the defense of Antwerp with a naval division and an armored train known as "H. M. S. Churchill," and an aero squadron. This squadron was one of the few complete units to get clear of that fortress, the planes flying and the motor cars that comprised the transport fighting their way through the encircling German lines and proceeding west to the port of Dunkerque, where a permanent base was formed, from which they afterward conducted innumerable scouting expeditions and raids into territory more or less occupied by enemy detachments, harassing fairly large units and often totally destroying smaller ones, and numerous patrols.

Armor for Transport Chassis

The cars used in this work were taken from the transport column, and a preference seems to have been given to the Rolls-Royce, as its speed and quietness were two very important features in this class of fighting.

With the assistance of a large shipbuilding yard in Dunkerque, they were fitted with gun mountings to support two or more Lewis or Maxim guns, and a few sections of mild steel sheeting as used in ship work, of about 10 mm. thickness, were bolted over a few places where protection was most essential, such as the radiator, the gas tank and the engine. Even this was but scant protection from a rifle bullet when fired from anything like close range, but it was the best that could be had at that time, though on other occasions they were under point-blank running fire with less

protection than this, and managed to get off with few casualties.

For their defense, however, they relied principally on taking the enemy by surprise; a short, sharp engagement, and if unsuccessful, a quick get-away, where their superior speed would soon take them out of range.

Short Night Trips

At first, their movements were limited to short night trips along the roads leading to towns or villages known to have been recently occupied by advance patrols of enemy detachments that were gradually spreading over that part of the country, and when a favorable position was reached—usually a cross road or a wide place in the road with trees or shrubbery that afforded concealment—the cars would be turned around in the direction of home, all lights extinguished, and with engines throttled, all would be in readiness for the first enemy that appeared.

These operations were almost always led by Commander Sampson in person, and never was there any shortage of volunteers to drive the cars or handle the guns, though all realized that the risks were tremendous and the odds never in their favor, as seldom indeed were there less than ten riders in these patrols, and with ditches on each side of the road, a trained man on horseback was decidedly apt to have the advantage in maneuvering.

However, as previously stated, the very audacity of these raids made them a success, and the seriousness with which they were felt by the Germans is best illustrated by the large reward that the Kaiser offered for the head of Commander Sampson, or his capture.

So adroit did these men become in this sort of work that it was not unusual for them to have one or more engagements the same night, while as many as three distinct encounters before sunrise have been recorded. The villagers near their headquarters became accustomed to seeing piles of saddles, rifles, lances and other equipment, and occasionally a string of horses, that was the result of their night's work.

Covering the Retreat

While most of these operations took place in the vicinity of the coast, they made frequent trips far to the south, the most spectacular one being the occupation of the town of Douai, in the face of the advance of Von Kluck's flanking force that was then proceeding north, where Commander Sampson took charge of the few remaining French forces in the town and skillfully conducted their retreat, he, with the cars, remaining behind to the last and barely escaping capture, having to actually fight their way through the advancing line of skirmishers.

It must have made a great picture with these cars tearing

madly along the road, several of them old London omnibus chassis fitted up for the purpose, the enemy's cavalry skirmishers having dismounted and advancing on foot through the woods in an endeavor to head them off, while the flashes of the machine guns and rifles from the cars, showing against the dusk of the evening, gave a spectacular quality to the scene.

On the other hand, it clearly shows that if a few determined men in motor cars, indifferently armed and poorly armored, can operate with such success against field troops for so long a time, what might have been the result had it been possible, in the early part of the war, before trench fighting commenced, to place several brigades of properly organized and trained armored cars, mounting light artillery, to conduct a series of such raids on an enemy's flank.

About the time these cars were armored, the first attempt was made to adapt artillery so as to operate it in connection with them, not by mounting a field piece on the car itself, as

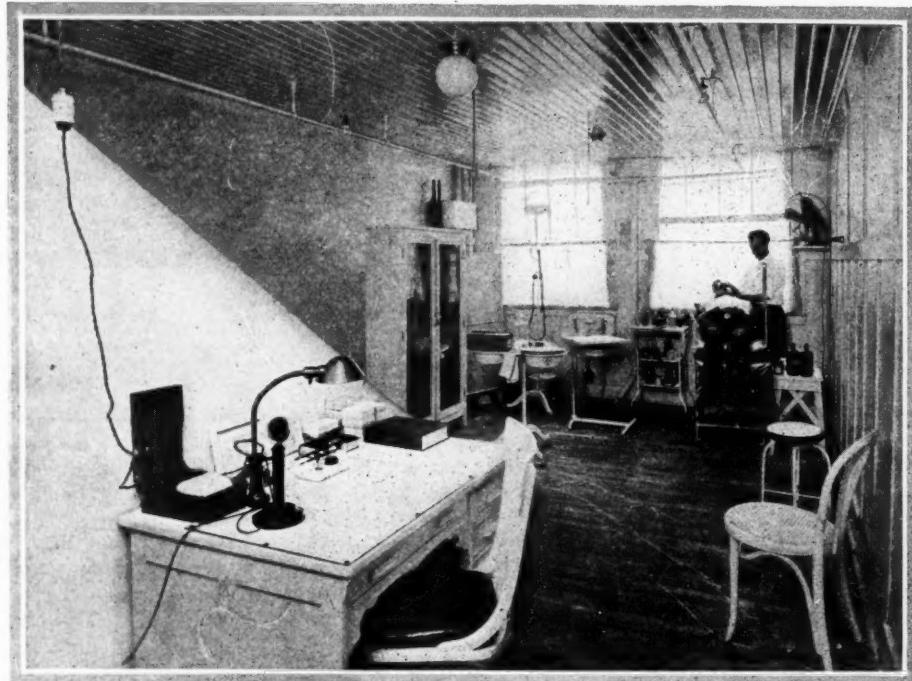
they were not built sufficiently strong to permit this, but in replacing the gun carriage with an automobile type of axle, with wire wheels mounting dual pneumatic tires, and the whole towed behind one of the armored cars.

Credit Due Captain Wilding

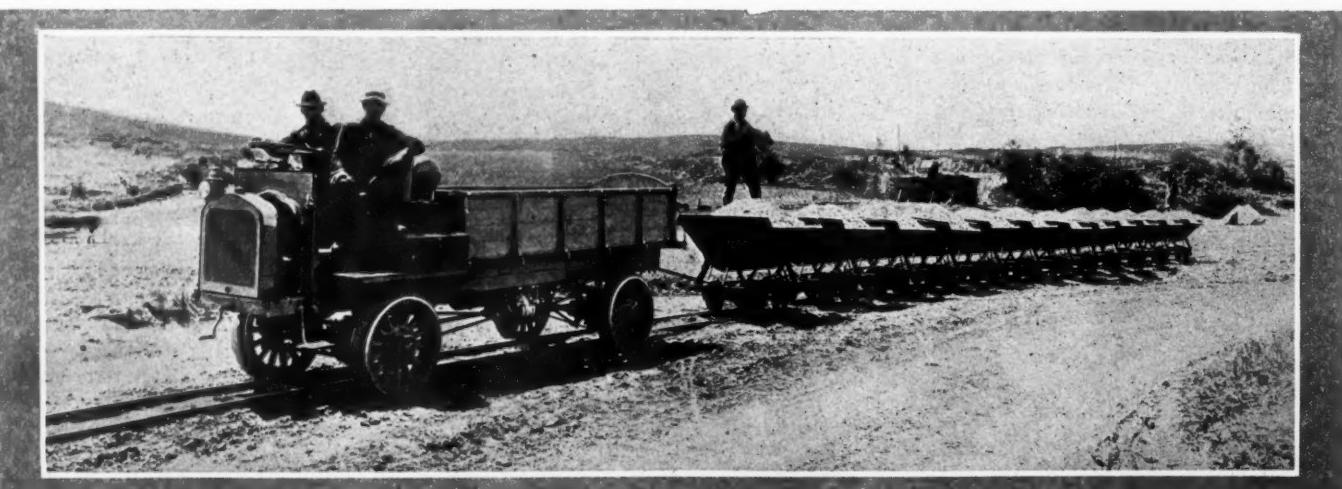
Credit for this is principally due to Captain Wilding, the well-remembered tennis player, who was so popular in the United States just before the war; and with it, he did excellent work in advanced positions that would have been impossible to reach except for this type of carriage. In fact, in his case, it worked too well, for so annoying did it become to the Germans that they made special efforts to get him, using their heaviest artillery lavishly, which is quite a compliment in its way. They finally succeeded in dropping a coal-box—a 42 cm. shell—onto the top of the dugout in which he and some others had taken shelter when they had first started to shell him.

National's Factory Hospital

ONE of the most recent developments of the safety first movement which has been inaugurated at the factory of the National Motor Vehicle Co., Indianapolis, Ind., is the installation and equipment of the small but complete hospital shown in the accompanying illustration. This department is located on the second floor of the most central building of the company's plant and is in charge of a trained attendant who is ready at all times to render intelligent relief and first aid service to employees who have been taken ill or injured in an accident.



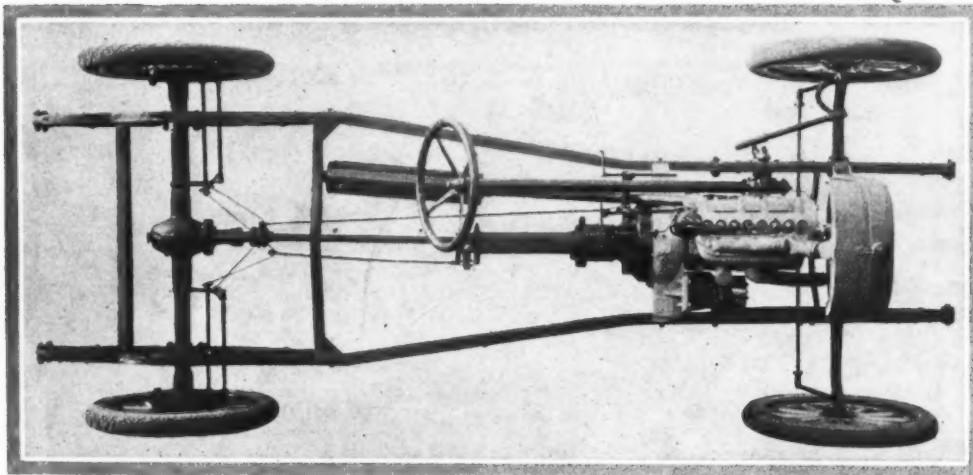
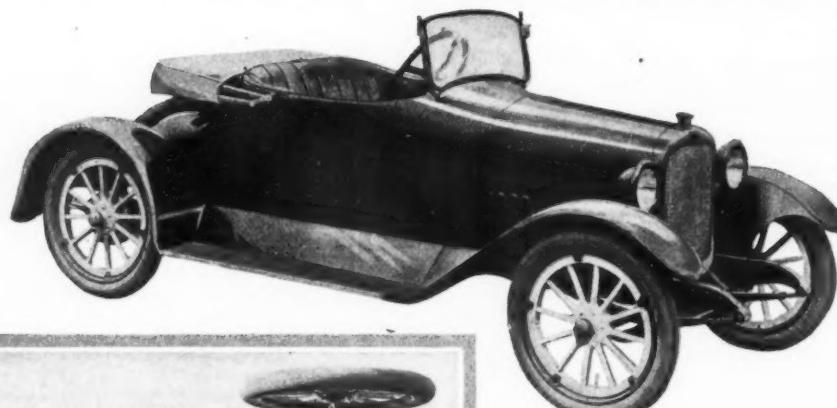
3-Ton F-W-D Truck Hauls 26-Ton Load



The illustration shows a 3-ton truck built by the Four Wheel Drive Auto Co., Clintonville, Wis., hauling a dozen trailers each of which carries $1\frac{1}{2}$ cu. yd. of crushed rock. The truck straddles the narrow-gage track on which the trailers run. According to the Hanlon & Oakes Co., contractors, Sioux City, Ia., fifty teams and trucks were unable to do the work which this truck does at a daily cost of \$17. The material is used for the construction of a concrete highway and the truck pulled it up a 5 per cent grade.

Low Seats in Maibohm Roadster

\$695 Sporting Roadster Is Low Hung with Rakish Lines—Engine High-Speed Four Carefully Balanced



Great simplicity characterizes the chassis lines of the Maibohm, while the body is quite distinctive. Colors are optional and complete equipment is included for \$695

sets of accurately even weight. Lubrication is cared for by a cam-operated, plunger pump which sends a pressure supply to each of the main bearings and also fills dip troughs under the connecting rods. The oil pan is pressed steel and is provided with a level gage. Rather

special pains have been taken to place the oil filler where it is readily accessible, and the illustration of the right side of the engine shows the size and position of the filling cap clearly. This same view also shows the location of the 12-volt Disco motor-generator which is driven by a silent chain from a sprocket mounted on the crankshaft just back of the main bearing at the flywheel end.

The manifolding is unusual, since the exhaust and intake are cared for by a single casting. This insures the supply of adequate heat to the gas and keeps warm the whole of the Zenith carburetor which bolts direct to the manifold. There are no internal passages cored within the cylinder casting of the engine.

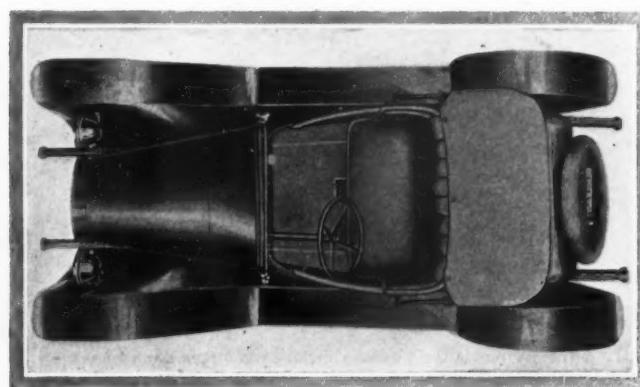
For ignition there is an Atwater Kent Unisparker with automatic advance, mounted upon a vertical shaft that is driven from the rear end of the camshaft; this allowing the use of very short ignition leads. Cooling operates on the convection or thermo-syphon system without a pump, and it should be noticed that the tall, narrow radiator is especially well suited to this form of cooling.

Extension Carries Levers

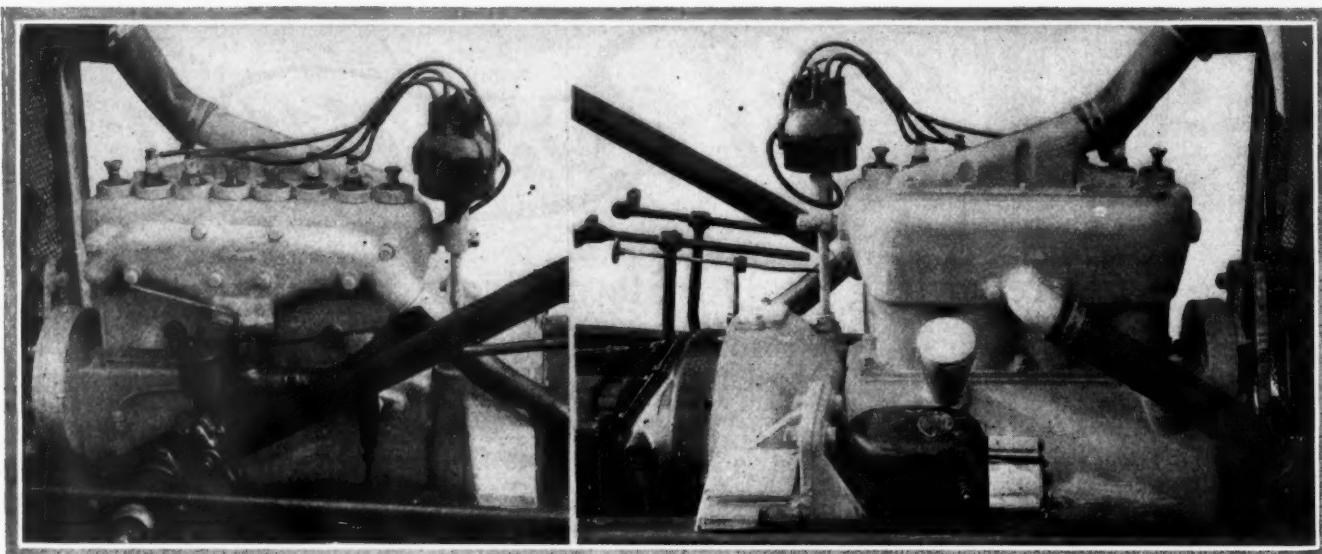
In unit with the engine is a dry-disk clutch with three plates, and this connects to a three-speed gearset. Naturally the gearset comes just beneath the dashboard, so a special casting is bolted to the rear end of the transmission, stretching back to the seat line. On the end of this casting the gear and brake levers are mounted, the arrangement being shown in the plan view of the chassis.

Hotchkiss Drive Used

There is nothing unconventional about the axles, that at the rear being three-quarter floating. The 46 by 1 1/4-in. rear springs take both drive and torque. The frame layout is rather unusual, having all four springs mounted beneath it



This plan view gives some idea of the seat width



Left—Shows the combined intake and exhaust manifold used on the Malbohn engine. Right—The electric unit

and none outside. It is 3 in. deep of $\frac{1}{8}$ -in. stock and is well kicked up over the rear axle. The wheelbase is 105 in. and the tires 30 by $3\frac{1}{2}$ -in. on either wood or wire wheels.

That special care was taken in designing the seat has already been mentioned, but there is another particular body feature, this being the provision of an extra large baggage

compartment below the rear deck. This baggage case has a large door, closing flush and fitted with a Yale lock. The windshield is mounted with a rake and the one piece top folds down flat so that it accentuates the body lines. Optional colors are obtainable, an almost unheard of thing on a car costing only \$695.

McCormick Primer Is Electrically Operated

THE McCormick Laboratories of Dayton, Ohio, have secured patents on a very accurate device which measures a precise quantity of gasoline which it transfers into a pipe whence it reaches the cylinders successively during the suction stroke.

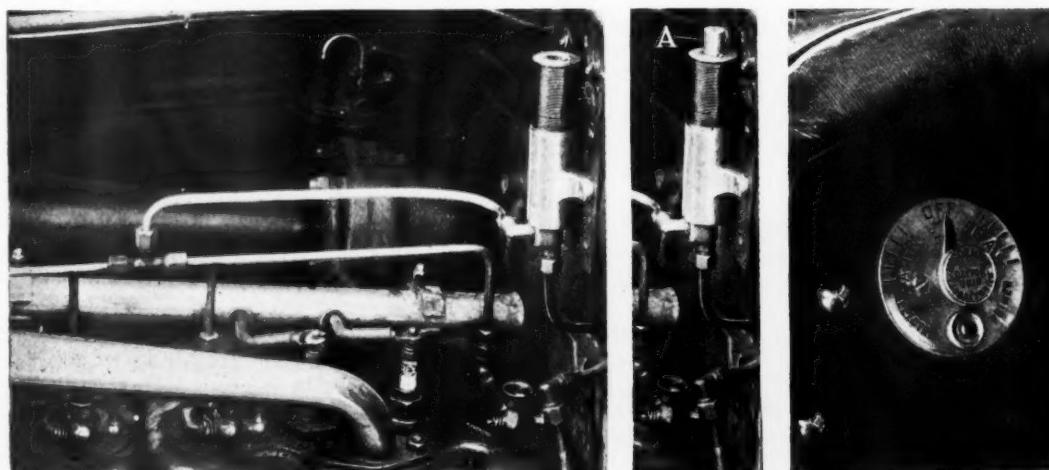
Beginning at the cylinders there is a small check valve screwed into a valve cap or other convenient place, and these check valves are all joined to a tube running along the cylinder top. The valves open during the suction stroke, but are kept closed as long as there is any pressure within the cylinder. From the middle of the standpipe connecting the check valve a second pipe runs to an electrically-operated pump mounted on the dashboard. This pump has a suction line connected to the main gasoline supply somewhere near the carburetor and the plunger is lifted by a solenoid when current is switched on. On the cowlboard there is a dial with

a button controlling a cock on the supply side of the pump and beneath this turn button there is a knob which sends current around the pump solenoid when depressed.

To operate the primer the knurled button is turned to the right and the electric button depressed for an instant. Sending current through the solenoid lifts the plunger, and as soon as the electric button is released the plunger falls, driving gasoline down to the check valves above each cylinder. The starter pedal is then operated and the engine sucks in charges of gas as it revolves. As long as the finger on the cowl dial is kept on the right-hand side the suction will continue to draw gasoline through the little check valves direct from the main supply line, so it is possible to run the engine indefinitely without the carburetor coming into action. As soon, however, as the engine starts it is usually possible to

turn off the supply to the primer by bringing the pointer on the cowl to the off position. The same instrument can also be used for supplying additional air. By turning the pointer to the left instead of to the right, the check valves are put in communication with the atmosphere instead of with the gasoline, so that on each suction stroke a small quantity of air is drawn direct into each cylinder.

The device renders it possible to prime directly into the cylinders and eliminates the necessity for soiling the hands by lifting the hood.



Left—McCormick primer which combines an auxiliary air supply. Plunger is in normal position. At A it is at top of suction stroke. Right—Knurled knob and pointer gas and air control. Electric pushbutton is at bottom of dial



The Rostrum

Preventing Valve Stems from Sticking

EDITOR THE AUTOMOBILE:—I have a Chandler 15 and am having trouble with sticking valve stems. Every 1500 to 2000 miles carbon has to be burned out, valves ground and valve stems cleaned and some of them straightened. I am using a high grade medium oil. The repair man says piston rings are not at fault.

Would new valve stems be advisable? Can you suggest a cure? The car has been run 15,000 miles.

Needham, Mass.

—It would be advisable to try relieving the valve stems making them $1\frac{1}{4}$ of an inch smaller in diameter for a distance of $1\frac{1}{4}$ in. downward from underneath the head. This should give more room for any carbon accumulation and ought to prevent the valves from sticking.

It might possibly be advisable to try relieving two or three of the valves and see whether this makes those particular valves perform satisfactorily, without relieving all the lot.

If you have to have carbon burned out every 1500 to 2000 miles it is difficult to believe that you are not getting too much oil into the cylinders. Some of the patented rings are very successful in reducing the amount of oil that reaches the cylinder head and I think you would be well advised to try at least one patent ring on each piston.

Wants Data on Hudson Super-Six

Editor THE AUTOMOBILE:—What is the timing of the 1917 Hudson Super-six?

2—What is the lift of the valves and the angle of valve seat?

3—Is the cylinder offset to reduce piston thrust?

4—What is the diameter and length of connecting-rod bearing?

5—What is the timing of the 1916 Marmon?

Trenton, N. J.

P. F. H.

—The valve timing of the 1917 Hudson Super-six is as follows: Inlet valve opens 7 deg. after top dead center. Inlet valve closes 42 deg. after lower dead center. Exhaust opens 55 deg. before lower center; exhaust closes 8 deg. after top center.

2—The lift of the inlet valve is 0.3125 in.; the lift of the exhaust valve is 0.3250 in. and the angle of the valve seat is 45 deg.

3—The cylinder is not offset to reduce piston thrust.

4—The diameter of the lower end of connecting-rod bearing is 2.250 in. and its length is 1.989 in.

5—The timing of the 1916 Marmon is as follows: Exhaust closes 12 deg. past top center; inlet opens 19 deg. past top center; exhaust opens 45 deg. before bottom center; intake closes 35 deg. past bottom center.

Gear Ratio on Packard Twin Six

Editor THE AUTOMOBILE:—Kindly furnish me with gear ratio and firing order of the Packard twin six.

Des Moines, Iowa.

J. D. E.

—The standard gear ratio of the Packard twin six in high is 4.36 to 1. The firing order in each block is 1, 4, 2, 6, 3, 5, the impulses alternating between the two cylinder blocks.

Numbering the cylinders in succession, beginning with number one at the front of each block, the firing order would be 1R, 6L, 4R, 3L, 2R, 5L, 6R, 1L, 3R, 4L, 5R, 2L, the R and L designating the right and left cylinder blocks.

Racing Compressions Are Variable

Editor THE AUTOMOBILE:—What compression is used in the Peugeot, Delage, Duesenberg, Mercer and Stutz racing cars? Please give compression for both 1914 and 1915 Stutz cars.

2—What compression is used in the Packard, Cadillac, Hudson, Franklin and Biddle stock cars?

3—I have seen the statement that for a given sized combustion chamber the compression increases as the motor speed increases. Will you kindly explain this?

Riverton, N. J.

R. R. W.

—The compressions used in the racing cars you mention are not available. As a matter of fact, the best compression for racing is usually found by trial and it is liable to vary from time to time. The normal compression for a racing car is about 90 lb. gage.

2—The compression used in the cars you mention is as follows:

Packard—Between 75 and 80 lb.

Cadillac—85 lb.

Hudson—Between 75 and 85 lb. at 100 r.p.m.

Franklin—About 70 lb.

Biddle—70 lb.

3—You have this the wrong way around. The gage compression will be greatest when the engine is running slowly because then the piston is able to draw in a full charge through the valve. When the engine is running fast the wire-drawing action of the valve cuts down the total volume of the charge and the compression is correspondingly reduced. With most engines there is one speed depending upon the valve timing at which maximum compression is registered.

Revamping a 1910 Velie for Speed

Editor THE AUTOMOBILE:—I have read with interest your answer in the Aug. 31 issue of THE AUTOMOBILE to R. W., who is rebuilding a Haynes model T for speed.

It happens that I am the proud owner of a 1910 model four-cylinder Velie 4 $\frac{1}{2}$ by 5 $\frac{1}{4}$. Owing to the fact that No. 4 cylinder has become scored decreasing the power output of that cylinder so that on a hard pull the uneven flow of power is noticeable, I am figuring on having all cylinders bored out and new pistons made so that even amount of power will be obtained from each cylinder. I am not an expert mechanic or automobile engineer, and so probably do not understand all that might be implied from your answer to R. W., but it does seem to me that with this engine working with gas-tight cylinders as it should when reboored and fitted with new pistons and rings (hot air connection to carburetor) that I should get results from it to compare favorably with an engine of 1916 design. Of course I know that 1916 engines are designed with smaller bore, and designed to run at much higher number of revolutions per minute, and are geared for

higher number of revolutions in comparison with car speed, but it seems to me that I should get as much efficiency out of this 1910 engine as I would from a 1916 engine of the same volumetric capacity per rear wheel revolution at speeds of from 10 to 30 m.p.h. Understand, I do not care for high speed performance from this engine as I am satisfied with ordinary touring speeds.

Would it be advisable to crown the new pistons at all? I notice the old pistons are flat. The cylinder heads are integral with the cylinders, and presume they could easily stand the higher compression; however, if this would result in higher explosive pressures, the crankshaft bearings might not be designed to take care of that and I believe that the engine would not run as smoothly at low speeds.

Is there anything that you would advise in connection with reborning and fitting new pistons to obtain more satisfactory service from this engine?

Buffalo, N. Y.

L. S.

—You would probably get very good results by boring out cylinders and having new pistons made as you suggest. It would not, however, be wise to crown the pistons, as you will have trouble with pre-ignition and rapid carbon formation if you raise the compression. You could get new pistons partly finished from the Velie Motor Vehicle Co., Inc., Moline, Ill., and your local repairman could finish these to the exact size to suit the rebored cylinders.

While rebuilding the engine make sure that the valve seats have not been ground down so that the valve head sits in a little pocket. It might be advisable to have a light cut taken on each valve seat. See also that the valve stems are a good fit in the guides and not worn, particularly the inlet valve stems. If these wear too small air is sucked up and this disturbs the proper functioning of the carburetor.

While the engine is torn down examine the oil pump carefully and if the gears are worn on the sides, so that they are not a close fit sideways in the case, the latter should be faced down so that the pump cover will be brought closer to the gears. This will increase the amount of oil pumped.

Changing Overland 69 Oiling Inadvisable

Editor THE AUTOMOBILE:—The new oiling systems are giving so many more miles per gallon of oil on practically the same make of engines, could the old mechanical oilers, such as is on Overland 69-T 1913 cars be adjusted to give more miles per gallon of oil without danger of ruining the engine? The new oiling systems are splash systems in one sense of the word and the old mechanical systems merely feed oil into the crankcase, which in turn is splashed on to the cylinder walls, so what is the difference?

2—Would you advise putting a new carburetor on such cars as 1913 model mentioned above, that is, would a new carburetor use less gas per mile than the old one that came out of the car?

3—Can you suggest any other changes that would likely show a saving in gas?

4—What firms make an inclosed body to fit this car?

5—From Greenville, S. C., to Jacksonville, Fla., which is the best route, via Atlanta, Macon, Valdosta, or via Columbia, Augusta, Savannah, and about what is the mileage each way?

Inman, S. C.

C. G. F.

—The model 69 cars were all equipped with a mechanical force feed oiler with lines directed to the cylinders, timing gears and the rear crankshaft bearing, the intention being to lubricate the above-mentioned parts, while, of course, the connecting-rods, wristpins and main crankshaft bearings were all lubricated in the usual way by splash. It is very true that by making certain adjustments to the oiler it can be adjusted so as to keep a sufficient quantity of oil in the motor oil base to properly lubricate the motor. However, this would not be advisable inasmuch as the oil directed to

the cylinders would no doubt cause excessive accumulation of carbon, and consequent fouling of the spark plugs at occasional intervals.

Thus, it would probably not be advisable to make any changes in the lubricating system. If the engine is properly lubricated and in good condition, adjustments should be readily made that would not require over 1 gal. of oil for each 350 to 400 miles of car running. However, if the car has seen constant service since the year 1913, no doubt parts of the lubricator are worn, and this naturally decreases the oil mileage.

2—Probably you could obtain better mileage with a new carburetor. You would be best advised to take this matter up with the maker of the carburetor now fitted to the car who will know whether one of his later models will give you better results.

3—Only that you take care and see the transmission and wheel bearings are properly fitted and lubricated so that there is no unnecessary friction.

4—The manufacturers of the chassis have no special closed body which would suit you and your best plan would be to inquire of your local dealer. It is, however, doubtful whether it would be worth while to have a closed body built for a 1913 car as it might cost as much as buying a new car with a closed stock body.

5—The best way from Greenville to Jacksonville is as follows: To Athens, 102 miles; to Macon, 97; to Waycross 174; to Jacksonville 81 miles, making a total of 454 miles.

No Formula for Dynamometer Power

Editor THE AUTOMOBILE:—Kindly publish complete formula for calculating the horsepower from a fan dynamometer and an example of its application.

Detroit, Mich.

W. L.

—There is no formula which can be relied upon for calculating the horsepower of a fan dynamometer. The reason is that as the fan's speed increases it begins to beat out a hollow in the air and the resistance, therefore, drops below what it would be theoretically. This effect is known as cavitation. It is similar to the action of a gear cutting out a hollow in soft grease. The only way in which the power absorbed by any given fan can be ascertained is by driving it at different speeds with an electric dynamometer and actually measuring the horsepower absorbed.

Removing Tar from Car Body

Editor THE AUTOMOBILE:—What is the best method of removing tar or Tarvia from my car? I recently had to drive twice a day for 2 weeks over a road freshly covered with it. The chassis is absolutely covered and the body not much better.

Westmount, P. Q., Canada.

A. E. J.

—Soap and water used promptly will generally remove tar or Tarvia. It can also be softened by the application of butter or oleomargarine without damage to the varnish.

Another good solvent is cocoa butter, which is used in the theatrical profession for removing grease paint. This can be purchased in some drug stores and is a harmless solvent for all kinds of oil and grease as well as tar.

Wants Differential and Transmission Assembly

Editor THE AUTOMOBILE:—Are there any concerns making a transmission and differential assembly that is interchangeable with the one used on a 1912 Flanders 20 model? If so, please give list.

Burlington, Vt.

H. L. W.

—THE AUTOMOBILE has no record of any concern making such an assembly as you require.

Accessories

Anti-Skid Shoe

THIS shoe is made of two-ply leather reinforced up the middle with an extra strip which is studded with rivets having heads about $\frac{1}{8}$ in. thick. The chains that cross the reinforced part of the shoe, as shown in the accompanying illustration, are made of heavy wire of high tensile strength. The shoe can be used as a blow-out patch; it acts as a preventive of blow-outs when strapped to the weakest spot on the tire; it gives traction when the wheels are stuck in the mud and the manufacturer states that it cannot injure the tire. The shoe is held on the tire by 1-in. chrome leather straps lacing through rings and the strap and buckle adjustments render it possible to draw up the shoe very tightly. Since the straps are attached to the boot the shoe cannot be lost. When the shoe is used for a blow-out patch the anti-skid chains are easily withdrawn by slipping a small ring through the brace and their replacement is just as simple. With non-skid chains the 3 by 3½-in. size sells for \$2.50; 4 by 4½-in., \$2.75; and 5 by 5½-in., \$3. Chains, including end rings, list at 25 cents for set of three in the 3 by 3½-in. size, 35 cents in the 4 by 4½-in., and 45 cents per set in 5 by 5½.—Auto Anti-Skid Shoe Mfg. Co., 31 Nassau Street, New York City.

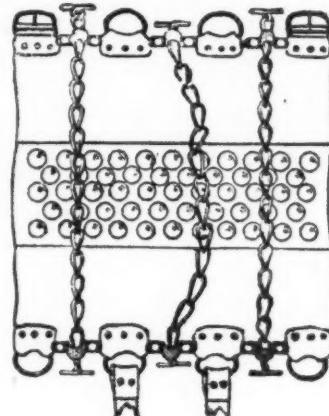
Sebring Tire

This seven-ply tire is impregnated with pure gum rubber and has a non-skid tread. The gum friction coat is built between the fabric and the tread and is said to promote easy riding and to require a low tractive effort. Straight side tires are offered and are applicable to any type of rim. The tires are retained on the rim by nineteen strands of piano wire. The Ford type tire is the only exception to this form of rim and is a regular clincher.—Sebring Tire and Rubber Co., Sebring, Ohio.

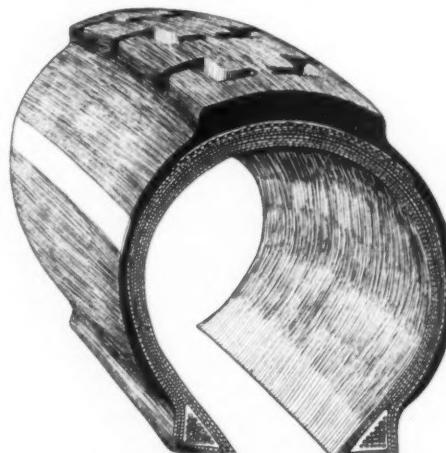
Johnson's Carbon Remover

This liquid carbon remover is easy to use, the spark plugs being removed and four tablespoonfuls poured into each cylinder. After 2 or 3 hours, or preferably after leaving the liquid standing over night, the engine is started, blowing the loosened carbon out through the exhaust. The remover softens the carbon and detaches it from the cylinder walls, etc., without in any way harming the engine. It sells for 50 cents per half pint, 85 cents per pint and \$1.50 per quart.

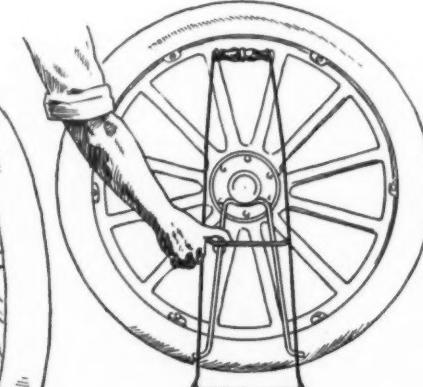
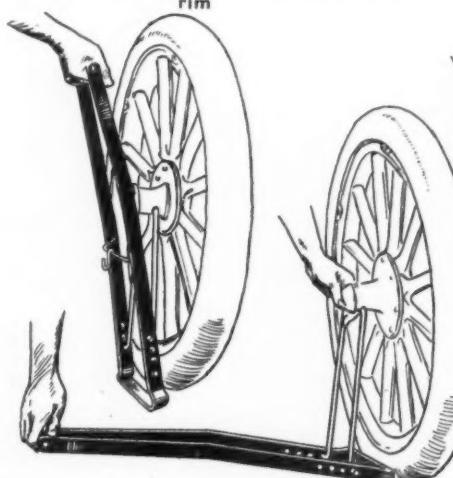
Johnson's Blac-Lac is a dressing for



Above—Anti-Skid shoe designed to act as a blow-out patch, to give traction and to prevent skidding. Below—One of the chains, which are easily detached



Section of Sebring Efficiency tire tread, showing wires that retain the tire on the rim



Trump jacks are useful as tire savers since they lift the car from the floor, thus not only relieving the tires of its weight but also keeping the rubber from contact with the oil on the floor, which is frequently a cause of deterioration of the rubber

tops, leather cushions, side curtains, tire covers and trunks. It is also useful for touching up other parts of the car, one coat being said to give a rich black finish to the parts mentioned, or to fenders, rims, running boards, radiators, lamps, etc. It is applied with a brush, being in liquid form, and is said to act as a preservative of leather, etc. It does not come off on the hands or clothing, according to the manufacturer, who also produces Johnson's Prepared Wax and Johnson's Cleaner for car bodies. The Blac-Lac sells for 40 cents per half pint, 65 cents per pint and \$1.10 per quart.—S. C. Johnson & Son, Racine, Wis.

Trump Jack

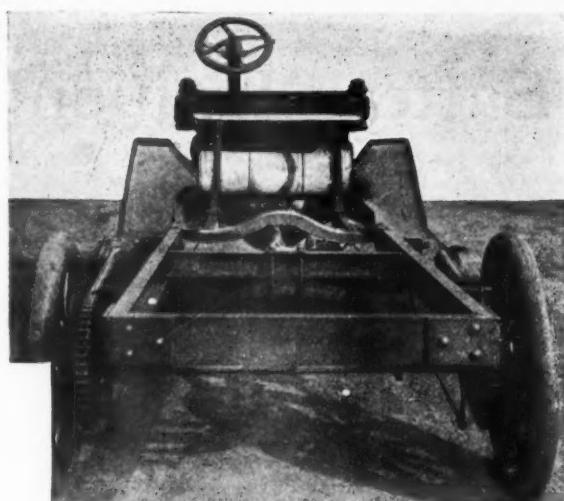
The car may be readily lifted from the floor by means of Trump jacks. A compound lever caught beneath the hub lifts the wheel free from the floor and locks it in the raised position. The strain on the tires is thus relieved and the tires are removed from contact with an oily floor. The height of the jacks may be adjusted and it is said that each jack will support 5000 lb. Price, per set of four, \$5.—Trump Products Co., Garland Bldg., Chicago, Ill.

Lewis Pneumatic Grease Gun

This gun is designed to handle lubricants of all consistencies from the hardest cup grease to the hardest cylinder oil, and may be used for filling or emptying gear boxes, differentials, etc. It is double acting and self filling. It is 2 in. in diameter and 18 in. long and is operated by compressed air at pressures of 50 lb. or more. There are two nozzles, one for fluids and the other for heavy greases. Price, \$10.—Lewis Pneumatic Grease Gun, Chicago, Ill.

U-Can-C Rain Shield

The U-can-C rain shield placed on the market last season has been improved by the use of somewhat larger vacuum cups made from rubber compound. Each cup is provided with a shank that facil-



Franklin Convertor for Ford chassis

itates its application and removal from the windshield. When in place before the driver's seat, the shield serves to keep the glass free of moisture and water by the aid of a rubber sealing strip. The use of the larger cups, says the manufacturer, causes cups to adhere rigidly even in a strong wind, or when applied to a dry glass. They may be rolled up and packed away in a tube 3 by 11 in. They are made for all cars. Amber shields sell at \$2 each; clear shields at \$1.50.—Frey Mfg. Co., 1326 Michigan Avenue, Chicago, Ill.

Apco Ford Breather Pipe

This breather pipe for the crankcase of Ford cars is an upright pipe, containing a fine screen, is secured to the oil intake by a hooked bolt that fastens around the timer retaining bolt. The installation is said to make the renewing of the oil supply an easy matter and to prevent the oil from spraying from the crankcase. The cover is easily removed or replaced, and the screen prevents the entrance of foreign elements. Price, 50 cents.—Auto Parts Co., Providence, R. I.

Glare-Off Lights

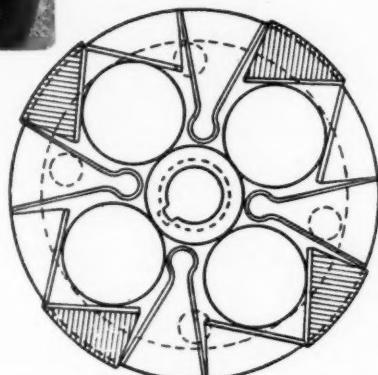
An ornamental metal shield covers the upper portion of the headlight lens and causing the light rays to be concentrated on the road. The ascending rays are reflected by the polished surface of the shield, thrown back onto the reflector of the lamp and thence onto the road in a manner that does not blind the oncoming driver. The face of the shield carries either a club monogram or any ornamental design desired. Price, \$1 per pair.—Glare-Off Co., 1777 Broadway, New York City.

Automatic Spark Advance

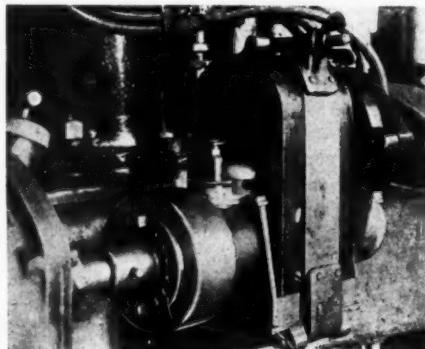
The spark is automatically advanced by the centrifugal action of four balls, driving and driven members of the coupling being constructed so that there are four V-shaped compartments in each one



Apco breather pipe for Ford cars, designed to facilitate renewal of the oil supply in the crankcase



Cross section of the governor on the Automatic Spark Advance. The centrifugal force of the balls in the V-slots advances the spark



Automatic Spark Advance as attached to a magneto

of which there is a ball. One side of the compartment is part of the driving member, and the other part of the driven. As the speed increases the centrifugal force throws the balls outward, and forces the sides of the V's apart, thus advancing the spark. It is said that it may be installed in place of the usual coupling between the pump and magneto and will fit any standard magneto.—Automatic Spark Advance Co., Monadnock Bldg., San Francisco, Cal.

Franklin Convertor for Ford

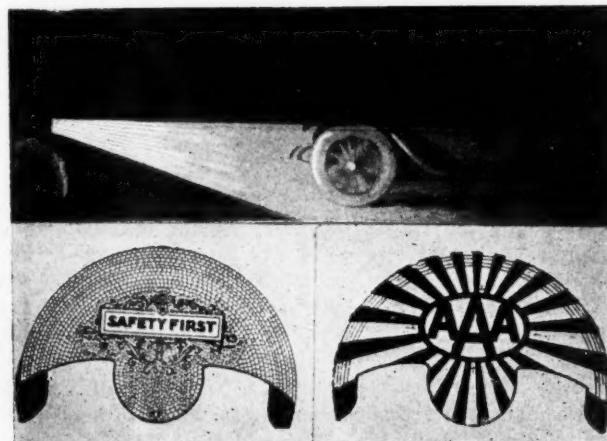
Converting the Ford into a 1-ton truck without damage to the chassis, permitting it to be converted back again into a passenger car, is the function of this construction. The rear axle becomes a jackshaft and is bolted onto the new channel frame by means of a special casting. A special bell-sprocket that telescopes over the brake drum carries the chain that drives the truck wheels, and permits the use of standard gauge. The change requires only the removal of the rear wheels, rear spring and radius rods and the bolting on of the convertor. It is claimed that no skilled labor or special tools are required to make the change. Price, model A2, \$345; model A3, with motor governor and jackshaft brake, \$400.—Franklin 2-Way Convertor Co., Herald Bldg., Chicago, Ill.

Oxy-Ignitor Spark Plug

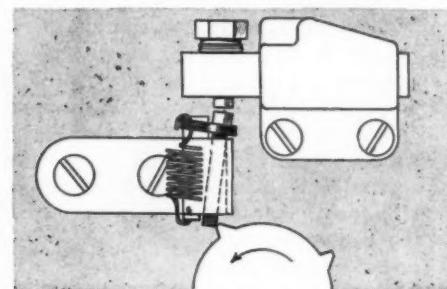
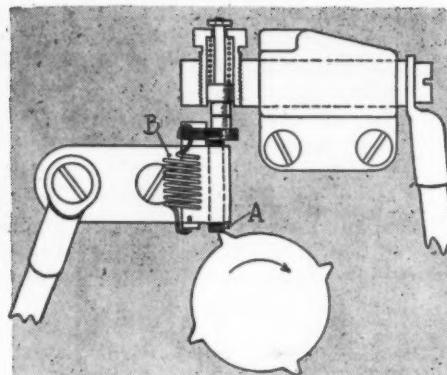
The Oxy-Ignitor plug replaces the O-G, the patent papers and exclusive manufacturing rights of the latter having been purchased by the maker of the new plug. Minor improvements have been made and the plug has been subjected to severe tests. The porcelain is inclosed by the shell and the central electrode terminates in four points, one or all sparking at the same time. The plug may be taken apart easily and all parts are replaceable. Each plug carries a guarantee to be sootless and to last during the life of the engine.—Oxygenator Co., 1919 South Michigan Avenue, Chicago, Ill.



Oxy-Ignitor spark plug



Glare-Off headlight regulators for concentrating the rays on the road



Full size sketch of Philbrin cam and contact action. Upper shows the cam lifting the contacts and closing the circuit. Lower indicates the way the trigger folds back should the cam turn around in the wrong direction.

PRODUCED by a man who has been in the battery ignition business for a good many years, the Philbrin duplex battery ignition has many unique points. It is made by the Philips-Brinton Co., Kennett Square, Pa., who are just ready to supply in quantities. As its name implies it is a system including two alternative methods of producing the spark, and either of these methods can be used with storage battery or dry cells. The two methods of spark production are called, by the makers, the main system and the secondary system, and as they operate on quite different principles they can best be considered separately.

The distinctive feature of the main system is the constructive detail of the contact breaker. This is small, very strong, gives a square contact between the points and a very quick break which is claimed to have less lag than any other type. In the sketch above the principal parts of the contact breaker are shown on a magnified scale. The upper contact is set in an adjustable socket backed by a strong coil spring. The lower contact is secured to the end of a hardened steel trigger *A* which can be lifted from beneath by the cam point. To follow the action imagine the cam rotating clockwise. The point of the cam will catch the foot of the trigger and lift it till the points are in contact. The spring above the upper point determines the firmness of the contact obtained.

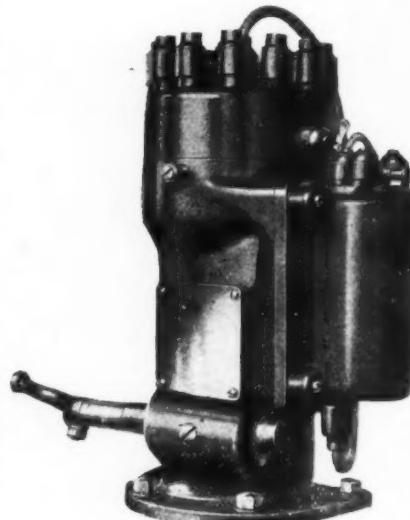
Lag Almost Eliminated

As soon as the tip of the cam reaches the edge of the trigger, all support is removed and the small coil spring *B* causes the trigger to fly back with practically no lag whatever the speed. This quickness is due to the very light weight of the trigger and to the rapidity of action obtainable from a coil spring.

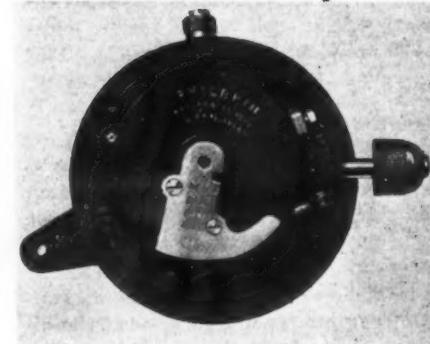
Now, it is easy to make a rapid action cam with a square drop like this, but precaution has to be taken to prevent the trigger from being broken off should the engine reverse its proper direction of rotation. To guard against this possibility of damage, the trigger slides in a groove as seen in

Philbrin Battery Ignition

New Duplex System Gives Alternative Forms of Spark Production—Includes Novel High-Speed Breaker and Follow-Up Spark System



Above—Twelve cylinder unit with coil mounted on the side. Right—The construction of the distributor terminals which give a very secure grip on the wires and view of the long sector suitable for a four-cylinder distributor.



the sketch, but this groove is open behind the trigger which is held in its working position by the spring. Thus, if the direction of rotation is reversed, the trigger merely moves back out of the way as if it were hinged at the top.

The cam points are so designed that they give a duration of contact equivalent to $3\frac{1}{2}$ deg. of movement which is sufficient to permit the current to saturate the condenser at speeds of the cam sufficient to fire a 12-cylinder engine at 5000 r.p.m. There is only one adjustment, this being the closeness of the contact points which should be about 25-30/1000 in., apart when broken. When the points wear down the need for adjustment will become apparent through the engine refusing to run at maximum speed; when this is noticed a fraction of a turn of the nut back of the upper contact will restore the original speed range.

The condenser for the main ignition is contained within the breaker box, and the coil is either combined with the distributor unit or is separate. The switch selects either storage battery or dry cells in the usual way.

For spark advance the Philbrin has no automatic mechanism this being said to be needless because of the absence of lag in the breaker. A lever is provided for hand advance and is made in two forms; one moves the whole distributor and another moves the cam without affecting the external parts.

In connection with this "main" system there is a distrib-

uter which is also part of the secondary system. It is mounted above the breaker box and is of the non-contacting type, where the high tension spark leaps a small air gap. Inside the distributor head are a number of brass studs corresponding to the number of cylinders, and above the breaker cam there is a Bakelite disk carrying a brass sector which conveys the high tension discharge to each of the spark plug leads in turn. It will be noticed that this sector is very long, being only a little shorter than the circular distance between any two of the fixed studs in the distributor head, this meaning that the front edge of the sector is within 7/32 in. of the stud ahead of it while its hind end is still level with the edge of the stud behind. The reason for this great length of sector is made plain by the description of the secondary system.

No Breaker for Secondary

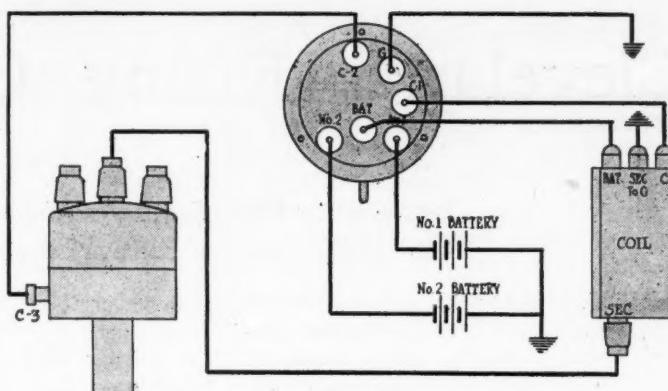
The secondary system uses no part of the breaker mechanism. Within the switch assembly that attaches to the cowl board, is a special form of vibrator, consuming little current and operating at a vibratory speed of from four to five times that of the old-fashioned coil vibrator. There is a very peculiar thing in connection with this vibrator, this being that it requires no adjustment, in fact the manufacturers disclaim all guarantee if the adjustment is altered within the lift of the contact points. The latter are large, and will wear a very long time, and it is stated that the action is not affected in any way by such wear as can occur up to the very last limit.

Two Switch Controls

Looking at the outside of the switch box it will be seen that there are two controls. The lever gives the "off" when in the middle position and can be turned right and left to pick up the storage battery or the dry cells. Above it and to the left is a knob moving on a ratchet. This gives a series of positions marked *M* and *S* meaning main and secondary ignition. When the pointer is opposite any of the *M* marks the breaker is working and the engine being fired on the single spark system, but when the pointer shows an *S*, it means that the contact breaker is cut out altogether and a continuous current is flowing through the vibrator all the time the switch is on.

Continuous Stream of Sparks

The vibrator is in circuit with the primary of the coil, so a steady stream of sparks is being sent to the distributor, and this is the reason for the long distributor sector. As the distributor turns it will continue to supply sparks to any one



Wiring diagram of Philbrin duplex ignition system

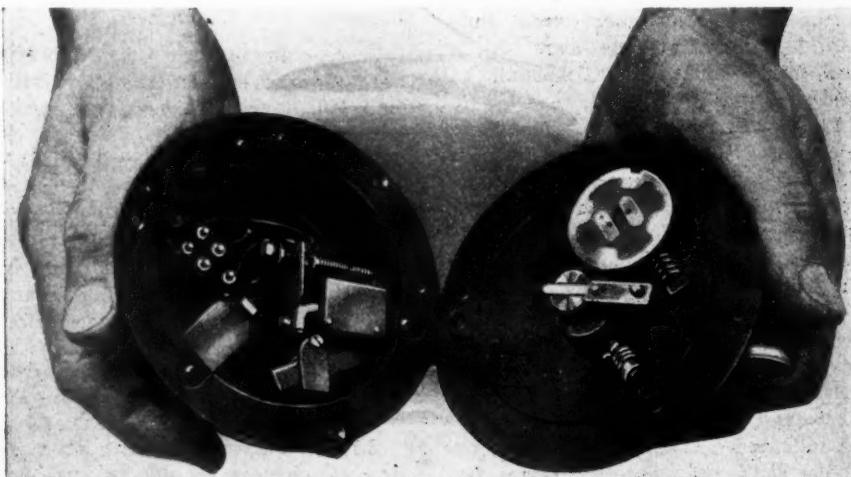
of the plugs during the whole time the sector takes to pass the stud in the distributor head. As the piston descends on the firing stroke the resistance at the spark plug points drops, so when the front end of the sector is approaching the next stud, there is no risk of a long thin spark jumping out ahead of the sector, the next spark plug will not get a spark at all till the sector is close enough to insure a good fat discharge.

Prevents Fouling of Plug Points

Naturally such a sort of ignition is very effective, particularly if the carburetor is not working well or if the engine is very cold, and it is also claimed that the continuous spark prevents oil from collecting on the plug points. The discharge is said not to injure the points because its intensity is never great enough to do them any harm, increased speed has no effect on the nature of the spark; there is no flame produced. As to the current consumed this is about one ampere, or similar in amount to that taken by a cowl board lamp bulb, much less than that consumed by a headlamp of ordinary size and power.

Current Reversed Constantly

It will be seen in the view of the switch cover that there are a series of *M* and *S* positions controlled by the ratchet knob. Their purpose is to reverse the direction of the current flow at each click of the ratchet and so equalize the wear on the contact points of both main and secondary systems. In the center of the main switch lever there is a lock operated by a key, and the cover of the switch cannot be removed even by taking out the screws as long as the lever is locked in the off position.



Left—Switch cover as it appears on cowlboard. Right—Inside of switch showing the vibrator employed for the secondary ignition and the details of the selecting and reversing switch which gives either main or secondary ignition and-reverses the direction of the current with each click of the ratchet

Cleveland—Rising City in the Industry

Part II

Over Eighty Manufacturers of Parts Produce in Cleveland Factories 70 to 75 Per Cent of the Automobile Parts Used in the Middle West

CLEVELAND, O., Oct. 3—According to the 1914 government census, Cleveland leads all other cities in the production of automobile parts which are assembled in other cities into complete cars. At present over eighty manufacturers of automobile parts are located in Cleveland, and the Cleveland Chamber of Commerce, which has been very active of late in inducing automobile industries to locate in Cleveland, has estimated that from 70 to 75 per cent of the automobile parts used in the Middle West manufacturing section are manufactured in the Cleveland district. These include drop forgings, sheet aluminum, sheet steel, frames, bearings, leather, paints, varnishes, etc. To these might be added various accessories, such as batteries, spark plugs, lamps, etc.

In its new campaign to increase its automobile manufacturing position, Cleveland, through its Chamber of Commerce, has announced that it does not covet Detroit's leadership as being the first automobile manufacturing city, but rather has in mind a much wider diversity of industries. The aim is to make the Cleveland district a unit within itself, capable of supplying its own needs in a manufacturing way, without being dependent on other cities.

To Attract Factories

With this end in view, the Chamber of Commerce is working to attract factories producing all varieties of automobile parts, and is at present looking for manufacturers of bodies, sheet metal parts, and additional frame makers. All of these are produced in Cleveland, but greater output is required.

In its work of securing factories for the city, the local chamber has never offered and declares it never will offer, any material inducements to industries seeking a location in Cleveland. There has been formed in the city, however, a Cleveland Industrial Development Co., with an initial capital of \$500,000, which interests itself in the financing of new factories, such as automobiles, parts and accessories.

Cleveland has many arguments which are advanced as potential reasons for automobile parts, and accessory factories locating there. It is a large primary and secondary steel city. Iron, ore, and coal can be assembled here cheaper

than in any other district in the North. It is a good city for working men, more than 25 per cent of Cleveland's present inhabitants owning their own homes. There is a 3-cent carfare covering the entire city.

A Large Railroad Center

This city offers exceptional shipping facilities in that over 350,000 sq. miles of country are served directly by the railroads radiating from this zone. This is practically 10 per cent of the total area of the U. S. A. Seven trunk lines enter the city, these including New York Central, Pennsylvania, Big Four, Nickel Plate, Erie, B. & O. and Wheeling & Lake Erie. The city is immediately served by the Cleveland Short Line Railway, a part of the New York Central. This belt line is 19 miles long and connects all railroads entering the city. There are thirty-nine freight stations within the city's switching limits and twenty-two passenger stations. In addition there are six electric interurban systems radiating from the city through Northern Ohio. Most of these carry freight.

Last week several of the Cleveland factories which are engaged in the automobile industry were referred to with the object of showing their growth during the past season. There are many others in the city, some of which refuse to make public figures showing the growth of the industry, and others from whom it has not been possible to get the information to date.

Columbia Axle Expands

The Columbia Axle Co., established 3 years ago, has increased its business four-fold during the past year, and now has capacity for 75,000 axles per year. Over 450 men are employed, and 50,000 sq. ft. of floor space used. New additions are planned to add 5000 sq. ft. of floorspace for rough stock and receiving department. These will be ready in 30 days. Besides manufacturing front and rear axles for several passenger car makers this concern manufactures truck axles for several concerns.

Reflex Business Gains 25%

During the past year the Reflex Ignition Co. has increased its business 25 per cent and doubled its manufacturing space. Over \$20,000 worth of new machinery has been added for its spark plug

manufacture. Its capacity is 3000 plugs per day. The factory has been working overtime 3 hr. per day since July.

Torbensen Boosts Production

The Torbensen Gear & Axle Co. has during the year added 60,000 sq. ft. of floorspace to its own manufacturing facilities and is employing 200 men. Over \$100,000 worth of new machinery has been installed. In 1915 approximately 1900 Torbensen axles were produced and sold to motor truck manufacturers. By the end of 1916, a total of 11,000 will have been produced and sold. For 1917 the production figure is 25,000. In addition to its own manufacturing facilities the company has had to contract with another Cleveland concern for manufacture of many axles.

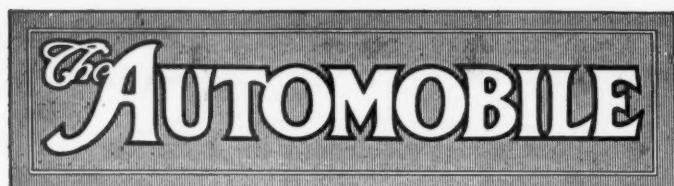
Hydraulic Pressed Steel Rushed

The Hydraulic Pressed Steel Co. has increased its business 15 per cent during the past year. In that time it has erected five new buildings as follows: A forge plant 360 by 80 ft.; an automobile frame plant 560 by 80 ft.; a receiving building 120 by 60 ft.; a power plant 80 by 40 ft., and a pump house 160 by 40 ft. Over \$400,000 worth of new machinery has been installed. The company now employs 1200 men, has a capacity of 1500 automobile frames per day, and two-thirds of its entire factory has been working at night since 1914. This factory is still another example of the great activity of Cleveland plants that are not much in the public eye so far as automobiles are concerned, but which manufacture many parts entering into cars made in many different cities.

Michigan Has 143,550 Cars

LANSING, MICH., Sept. 30—State records show that on Sept. 1, 143,550 automobiles were registered in Michigan, or 25 per cent more during the first 9 months of 1916 than during 12 months in 1915, when the total was 114,845. Of the 143,550 cars there were 10,196 commercial vehicles.

In Wayne County, in which Detroit is located, there are 41,375 of the 143,550 cars, or 10,348 more than were registered in 11 months last year. It is estimated by officials that the total registration for the year will be between 155,000 and 160,000 cars.



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Mismanaged Racing

THE finest speedway in the world situated within the greatest city in the world deserves the best management in the world. Judging by the general handling of the Astor Cup race it has got something much nearer the other end of the scale.

During the race a driver on pulling up at the pits complained of spectators standing *on the track* opposite the bleachers. When the winner pulled up at the pits a crowd of thousands swarmed the fences and blocked the pits, spreading out to the boards, where thirteen cars were still running at nearly one hundred miles an hour.

The Vanderbilt Cup race was abandoned because of the deaths it caused, but the danger to spectators on a road course is a tiny trifle compared to their danger on a speedway. Every race manager knows that the public in moments of excitement must be protected against itself, so when the custom of huge crowds is sought huge precautions should be taken. To get enough track guards to police the New York speedway as it should be policed is quite easy. Indianapolis with a far larger crowd to care for has never had any difficulty, though it is much harder to get an adequate staff there than in New York.

Then, again, the drivers who enter an event like last Saturday's have *some* rights. If the management care nothing for the public they ought at least to protect their entrants from the smash up which

only good fortune can avoid with spectators on the track. The drivers also have a right to expect that the times will be given out accurately and quickly.

The mismanagement of the Astor Cup race was thorough. Letting the crowd on the track was the biggest sin, but the timing was bad, and even the detail handling of the crowd was poor. In parts of the grandstand the attendants did not know the numbering system and could not show people their seats, and the second gate for pedestrians was not opened till more than an hour after the appointed time.

It is this sort of thing that kills speedways and kills public interest in racing.

The newspapers express wonder at the small size of the crowd, the owners of the track are naturally disappointed that they could not fill the grandstand nor get the patronage of a fifth of the people who could easily see a race on foot.

Tires

WHAT is the biggest item in the cost of motor-ing? Tires, because they wear out so fast.

American racing, culminating in the Astor Cup, has shown how to multiply tire life by ten. The racing tires which carried nearly every car in the race right through without changing a shoe are not yet tires of commerce, but they soon will be. The racing tire of today is the touring tire of tomorrow; so the time is in sight when tires will become much less troublesome than they are now.

Remembering the tire stops in the races of two years ago it seems incredible that so much improvement could be made in so short a time. Certainly the board speedway is kind to tires, also no doubt the cool air temperature on Astor Cup day was a help, but despite this the tire showing was a marvel.

That the winner could run right through at so high a speed is astonishing, but it would be far less pregnant with meaning were it not for the paucity of trouble on other cars. One example may be luck; a high average all around is proof positive that luck had nothing to do with it. Racing has contributed much to the betterment of the everyday car. The contribution from the American seasons of 1915 and 1916 is one of the most far reaching in its effect that the history of racing can show.

Obtaining Ideals

THE effort of the S. A. E. to prepare an ideal military truck specification is one of the most praiseworthy things the society has ever attempted. No engineer is ever able to build his ideal machine because of all kinds of limitations, but he has usually a very good idea as to what that ideal is. In preparing the military truck specification, the S. A. E. members will be untrammeled. They have not to consider price, nor their factory equipment, nor the ideas of their sales department; nothing troubles them except determining what they really think is best for the specially arduous conditions of military service.

Metz Has Balanced Crankshaft

1917 Model Reduced to \$545—Engine Parts Lighter—Body Improved

NEW YORK CITY, Oct. 1—The 1917 Metz will have a balanced crankshaft and will sell at \$545, f.o.b. factory, a reduction of \$55. The reciprocating parts of the engine have also been lightened. Body lines have been improved and a new ventilating hood has been provided with nickel-plated clamps. The new car has metal hood sills. The metal-covered windshield board has all been enameled. The steering column brackets have been improved and an electric dash light has been placed on the instrument board. Pockets have been placed in the tonneau board.

The standard wheel color is vermillion, with an option of white or purple blue. Either wire or artillery wheels may be had. Demountable rims are not furnished as standard equipment. The front guards are made to curve gracefully over the wheels and blend into the body sides by the use of a steel apron that protects the occupants of the car from road and wheel splash.

Commerce Enlarges and Adds Model

DETROIT, MICH., Sept. 27—Stockholders of the Commerce Motor Car Co. have sanctioned an increase of the capital stock from \$200,000 to \$400,000. A 1-ton model has been brought out by the Commerce company and 3000 of these trucks are scheduled to be made during the next 12 months. The chassis with driver's seat will sell at \$1,175. In addition to the 1-ton truck there will be made 1800 $\frac{1}{2}$ -ton trucks. The increase in business of the company has made it necessary to enlarge the plant and an addition 60 by 250 ft. is now being built.

Cotta Transmission Expanding

ROCKFORD, ILL., Oct. 2—The Cotta Transmission Co. has purchased 100,000 sq. ft. of land, upon which a factory of the monitor type will be erected. The present plant is to be abandoned. The change is made necessary by increased business and the necessity for enlarged quarters. The new plant will be ready Nov. 12 and will have 27,000 sq. ft. of floor space. At present the company is employing 100 men. The new plant will employ twice this number.

Agrimotor Will Design Tractors

LA CROSSE, WIS., Oct. 2—The Agrimotor Engineering Co., La Crosse, Wis., has been organized by C. W. Levis, for many years sales manager of the La

Crosse Plow Co., to engage in the design of tractors, farm implements and accessory lines. Levis has been elected president and manager of the new concern, which will make a specialty of marketing both patented and unpatented implements or parts and serve as agents for patentees and attorneys. In its agency capacity the company will endeavor to arrange for the manufacture of implements or attachments which have merit. A competent force of engineers, designers and draftsmen has been procured.

Chandler Starts New Assembly Building

CLEVELAND, OHIO, Sept. 30—Further expansion in the manufacturing facilities of the Chandler Motor Car Co. is marked by the beginning of construction of one new general assembly building 60 ft. wide, 500 ft. long and four stories high, and the addition of three stories to the 60 by 160 ft. service building erected earlier this season. With the completion of these two new buildings the Chandler company will have on its factory site five manufacturing buildings.

The new buildings will be ready for occupancy in time to help take care of the production of next year's series of Chandler sixes, a contemplated production of 25,000 cars.

The Chandler company also has purchased a large piece of property directly across East 131st Street from the main factory buildings, and on this property will, next spring, erect a building to be devoted exclusively to the handling of export shipments, installation of special foreign equipment, boxing cars ready for delivery to steamships, etc.

The comfort of Chandler employees has been borne in mind by the company in its extended building plans. One floor of the big service building will be devoted to a restaurant. Included also in the plans permitted by the new building is an emergency hospital in which a trained nurse will be on duty during factory hours and in which the company physician will make his headquarters.

Michigan Foundry to Be Doubled

ST. JOSEPH, MICH., Sept. 26—The Michigan Malleable Foundry Co. is to be practically doubled. A building, 100 by 300 ft., is now under way and contracts have been let for a further addition, 60 by 80 ft.

Rumely To Make All-Steel Tractor

LAPORTE, IND., Oct. 2—The Advance-Rumely Co. is experimenting in the manufacture of an all-steel tractor. Heretofore considerable wood has gone into the construction of tractor bodies. Recently the possibility of manufacturing an all-steel tractor gained headway in the Rumely office.

Belgian Engineers Arrive

Kelecom and Perrier, of Fabrique Nationale, Here to Visit Car Plants

NEW YORK CITY, Sept. 28—Two of the leading engineers, one of Belgium's largest motor car, motorcycle and ammunition factories, arrived in this country this week for the purpose of making manufacturing investigations and doing engineering work here. Both were engineers in Fabrique Nationale, the large factory at Liege which previous to the war manufactured F. N. motor cars, motorcycles, etc. Paul Kelecom was engineer of the motorcycle department of the factory for 12 years, and for 6 years previous was in the automobile industry. Julian Perrier has been connected with the engineering department of the F. N. factory since 1905, in charge of the development of automobile motors and motor car design. For 9 years he has been specially engaged in engineering research and laboratory work.

The F. N. factory was closed on Aug. 3, 1914, and since that date has been practically deserted. Over \$1,300,000 worth of machinery has been removed from the factory by the Germans and taken to Germany. The factory is now used as a field repair depot by the Teutons. Previous to the war the F. N. factory was building 1200 automobiles a year and upward of 4000 motorcycles. In addition to this there were a great many small firearms manufactured. Over 4000 men were employed. Since the outbreak of the war Messrs. Kelecom and Perrier have been engaged in the organization of the Belgian military motor transport system. Both gentlemen expect to make a tour of the U. S. A. automobile factories.

Three-Plow Tractor Sells at \$500

HAMILTON, OHIO, Oct. 2—J. A. Vail is president of the Vail-Rentschler Tractor Co., which will produce a three-plow machine to sell at \$500 to \$600. Other officers of the company, which has been capitalized at \$100,000, are: Secretary, Sam S. Vail; vice-president, C. B. Wing; chief engineer, E. O. Powers; field agent, L. F. Kerner. J. A. Vail, E. O. Powers and L. F. Kerner were connected with the Fairbanks-Morse Co.

Kerosene Carbureter to Be Made in Des Moines

DES MOINES, IOWA, Sept. 30—A carbureter attachment which can be fitted to any car and which will permit the use of kerosene will be manufactured by a Des Moines company, capitalized at

\$250,000, which has applied to the Secretary of State for a charter and which will be known as the Trotter Kerosene Carburetor Co. Directors of the company are: H. S. Butler, vice-president of the Iowa National Bank; D. F. Witter, vice-president of the Iowa Loan & Trust Co.; John Gilchrist, George Phillips, George Trotter, G. A. Huffman, and W. Hartley.

It is claimed for the device that it can be used for either gasoline or kerosene, and that it will increase the gasoline mileage by one-half, while securing from kerosene the same mileage as for gasoline without the attachment. The factory is to be erected here and a force of seventy-five will be employed.

Dechant Heads Case Advertising

RACINE, WIS., Oct. 2—George A. Dechant, Harrisburg, Pa., has been appointed advertising manager of the J. I. Case T. M. Co., Racine, Wis., to fill the vacancy caused by the resignation of Bertholf M. Pettit, who has joined the staff of the Curtis Publishing Co., Philadelphia.

Harding Takes Up New Detroit Job

DETROIT, MICH., Oct. 2—J. V. Harding, who was formerly the Detroit factory representative for the Goodyear Tire & Rubber Co., has left the field to become the general manager of the Neville More Room Steering Wheel Co.

New Departure to Double Output

30,000 to 35,000 Bearings a Day Will Be Made by July 1

BRISTOL, CONN., Oct. 3—The New Departure Mfg. Co., of this city played the role of host to its 2700 bearing workmen last Saturday when it staged an old-fashioned barbecue dinner of grilled lamb and all that goes with it. The dinner was one of the most pretentious ever held in New England by an automobile concern. It required eighty spring lambs which were stretched on skewers over a trench 328 ft. long filled with burning charcoal, to serve the 2700. In addition 11,000 ears of corn were needed and 30 bushels of potatoes. To make it a New England occasion all the bakeries in the vicinity were working on New England pumpkin pies. One of the outstanding features of the affair was the orderly precision in which the whole program was carried out, there not being any disorder from start to finish of the day's activities.

The New Departure company is making giant strides in the manufacture of its double and single row ball bearings. Its manufacturing capacity to-day is

21,000 bearings per day. This was the average production for each day of last week. The output is double what it was a year ago. It is planned to have the present output doubled by July 1 when there will be capacity for 30,000 to 35,000 bearings per day. By July 1, 4500 men will be employed.

To care for this rapid factory expansion twenty-three acres of land were purchased in this city last June. On it 102 homes for workmen's families have been completed. To care for single men the local hotel was purchased and accommodates 200.

The factory additions at present under way, are: One new four-story building, 60 by 450 ft., is one-half complete. It will be used for the manufacture of steel balls.

A contract has been let for another building 100 by 600 ft. part one-story and part three-story. It will be used for automatic work, press work, receiving and shipping. It will have two railroad sidings 950 ft. long.

At present the company is operating two factories, one in this city and the other in Hartford, Conn., where small bearings, such as required for magnetos, are manufactured. The New Departure started manufacturing double-row bearings 6 years ago, and single-row types 3 years ago. At present its output is equally divided between the two.



Scenes at the old-fashioned barbecue dinner given by the New Departure Mfg. Co., Bristol, Conn., to its 2700 bearing workmen last week. The dinner consisted of eighty spring lambs with all accessories, including stacks of New England pumpkin pies, 11,000 ears of corn and 80 bushels of potatoes.

Union Products Co. Formed

\$200,000 Company To Make Parts and Accessories in Rockford

ROCKFORD, ILL., Sept. 29—The Union Products Co. has been organized here with \$200,000 capital and will manufacture, among other automobile parts and accessories, a piston ring patented as No. 1,195,279, by D. D. Shierk. Exclusive manufacturing licenses have been obtained by the company on six issued patents and four that are pending covering the manufacture of wire wheels.

Officers of the new company are: President and general manager, A. H. Martin, formerly vice-president and sales manager of the Burd High Compression Ring Co.; vice-president, M. R. Harned; secretary, H. F. Norris; chief engineer, W. E. Williams, consulting engineer of the American Steel Foundries.

Plans for a factory have been completed and the work is being rushed on special machinery for the company.

Peerless Truck Order Increased to 100 Per Week

CLEVELAND, OHIO, Sept. 27—The order for motor trucks recently given to the Peerless Truck & Motor Corp., has been increased from sixty a week to 100 a week. Additions to the plant have made the increased output possible.

The new order comes through Gaston, Williams & Wigmore, Inc. If necessary the Long Island plant can be diverted from present work to fulfill the order.

Autocar Issues \$1,250,000 in Bonds

NEW YORK CITY, Oct. 1—The Autocar Co., Ardmore, Pa., has issued \$1,250,000 first mortgage 5 per cent serial bonds, dated Oct. 1 and maturing from April 1, 1917, to Oct. 1, 1921, in instalments of \$125,000 each. The capital stock of the company is \$2,000,000. The bonds are secured by a first closed mortgage on all

the company's property, whose replacement value is in excess of \$1,400,000.

For the last 2 years and 8 months, net profits of the company after depreciation have averaged \$500,000 per annum, after making ample allowances for depreciation. This is equivalent to eight times the interest requirements on the new bond issue.

Stability Marks Material Prices

NEW YORK CITY, Oct. 3—Automobile material prices last week were featured by a steady market. There were few changes and those changes that did take place were for the most part unimportant.

The only important change was that of Pennsylvania crude oil, which rose 10 to \$2.40 a barrel. Conditions in the oil field, however, are quiet despite the stir created by the oil advance. Demand for gasoline throughout the country continues strong with few changes occurring. New York gasoline continues unchanged at 22 cents a gallon.

Marathon Tire Increases Capital to \$1,000,000

CUYAHOGA FALLS, Oct. 2—At the annual stockholders' meeting of the Marathon Tire & Rubber Co., this city, held Sept. 27, it was voted to increase the capital stock from \$500,000 to \$1,000,000.

BeSaw Capital Now \$220,000

AKRON, OHIO, Sept. 30—The BeSaw Tire & Rubber Co. has increased its capital from \$150,000 to \$220,000.

Alford Becomes Nash Comptroller

DETROIT, MICH., Oct. 3—W. H. Alford has resigned as comptroller of the General Motor Corp., to take a similar position with the Nash Motor Car Co., Kenosha, Wis., effective Oct. 2.

Dividends Declared

Locomobile Co. of America; quarterly of 1 1/4 per cent on preferred, payable Oct. 2 to holders of record at close of business Sept. 30.

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Chge
Aluminum, lb.	.61	.61	.61	.61	.61	.61	...
Antimony, lb.	.11	.11 1/4	.11 1/4	.11 1/4	.11 1/4	.11	...
Beams and Channels, 100 lb.	2.76	2.77	2.77	2.77	2.77	2.77	+ .01
Bessemer Steel, ton.	45.00	45.00	45.00	45.00	45.00	45.00	...
Copper, Elec., lb.	.28 1/2	.28 1/2	.28 1/2	.28 1/2	.28 1/2	.28 1/2	...
Copper, Lake, lb.	.28 1/2	.28 1/2	.28 1/2	.28 1/2	.28 1/2	.28 1/2	...
Cottonseed Oil, bbl.	10.50	10.48	10.45	10.41	10.42	10.71	+ .21
Fish Oil, Menhaden, Brown, gal.	.58	.58	.58	.58	.58	.58	...
Gasoline, Auto, bbl.	.22	.22	.22	.22	.22	.22	...
Lard Oil, prime, gal.	1.08	1.08	1.08	1.08	1.08	1.08	...
Lead, 100 lb.	7.25	7.25	7.25	7.25	7.25	7.25	...
Linseed Oil, gal.	.73	.74	.75	.75	.75	.81	+ .06
Open-Hearth Steel, ton.	45.00	45.00	45.00	45.00	45.00	45.00	...
Petroleum, bbl., Kans., crude.	.90	.90	.90	.90	.90	.90	...
Petroleum, bbl., Pa., crude.	2.30	2.40	2.40	2.40	2.40	2.40	+ .10
Rapeseed Oil, refined, gal.	.90	.90	.90	.90	.90	.90	...
Rubber, Fine Up-River, Para, lb.	.72	.72	.72	.72	.72	.72	...
Rubber, Ceylon, First Latex, lb.	.60	.60	.60	.60	.60	.60	...
Sulphuric Acid, 60 Baume, gal.	1.50	1.50	1.50	1.50	1.50	1.50	...
Tin, 100 lb.	39.00	39.11	39.30	39.40	39.50	39.50	+ .50
Tire Scrap, lb.	.05 3/4	.06	.06	.06	.06	.06	+ .00 1/4

\$2,000,000 Truck Line

Co. Formed To Operate 104 Vehicles Between N. Y. and N. J. Cities

NEW YORK CITY, Sept. 30—The New York and New Jersey Express Co. has been organized to do a general haulage business by motor trucks between this city and New Jersey points within a radius of 20 miles. The project is the outgrowth of the great increase of manufacturing in nearby cities, including Newark and Elizabeth, whose outlet for export has been limited by railroad congestion. The company plans to put into operation 104 heavy trucks, contracts having been signed for hauling 55,000 tons of goods per month.

The company has \$2,000,000, 7 per cent preferred stock fully paid up and 10,000 shares of common without par value. The company's offices are at 309 Broadway.

Kilborn Is Liberty Sales Manager

DETROIT, MICH., Oct. 2—E. J. Kilborn, who for the past 2 1/2 years has been the manager of the Oakland Motor Co.'s Chicago wholesale branch, has been appointed general sales manager of the Liberty Motor Car Co. He is taking immediate charge of his new duties.

A. W. Franklin has been appointed Eastern representative and Nicholas Hall and D. C. Reeves have been made Southwestern representatives of the company.

Weston Stays with U. S. Tire

NEW YORK CITY, Oct. 1—J. C. Weston will remain with the U. S. Tire Co., instead of going to the Mitchell Motors Co., Racine, in the capacity of vice-president in charge of sales. Mr. Weston will assume the newly created position of director of sales, thus abolishing the post of sales manager formerly held by him. O. S. Tweedy has become general branch sales manager, having direct charge of all branches.

Couzens Heads Detroit Police

DETROIT, MICH., Sept. 28—James Couzens, who was one of the men who started the Ford Motor Co., and who resigned as its vice-president and general manager in 1915, has been appointed police commissioner of Detroit. He fills the vacancy of the former chief who resigned suddenly.

Swinehart Tire Business Increases 20%

AKRON, OHIO, Sept. 28—Reports submitted by Swinehart officials showed an increase of more than 20 per cent in the

volume of business. Net sales were reported to the annual meeting yesterday, as exceeding \$1,680,000, and according to T. F. Walsh, president, the business was never on a sounder basis. The factory is now turning out 500 tires a day.

The directors organized yesterday afternoon and will meet early next week to declare a quarterly dividend of 1½ per cent.

The following were elected directors: B. A. Polksky, Fred Snyder, W. M. Weldon, Charles Currie, T. E. Barry, Dr. E. L. Mather, T. F. Walsh, F. S. Long and R. E. May. Officers were re-elected.

New Overland Stock All Subscribed

NEW YORK CITY, Sept. 30—The \$15,000,000 common stock of the Willys-Overland Co., Toledo, Ohio, which was offered to stockholders a few weeks ago for subscription of \$44 a share was entirely taken up by the old shareholders, so that there will be none of the stock offered to the general public. The shares were subscribed for in proportion of one to each lot of five shares of common held, the exchange being on a share-for-share basis in respect to holders of preferred stock.

Hydraulic Pressed Steel Redeems Preferred

CLEVELAND, OHIO, Sept. 28—The Hydraulic Pressed Steel Co. is notifying preferred shareholders of its intention to redeem the present preferred issue at 102½ on Oct. 1.

Security Prices Rise

General Motors and Springfield Body Feature Market Activities

NEW YORK CITY, Oct. 3—Speculation in automobile and accessory issues last week was partly responsible for higher prices. Automobile securities have joined in the general rise of prices. At the present time interest rates are low and people are buying stocks both for speculation and investment purposes.

Last week Willys-Overland, General Motors, and Springfield Body common stock were in large demand. Willys-Overland, however, did not come up to expectations, as it was expected to rise to at least 48. Springfield Body rose 14 points to 96. The board of directors of that company has authorized the sale of 2250 shares of preferred stock to all stockholders, common and preferred, as of record, Oct. 9. These stockholders are granted the privilege of subscribing to the extent of 10 per cent of their holdings at \$110 per share, plus accrued dividend from Oct. 1 to date of subscription.

General Motors made a large gain for the week, closing yesterday at 720, just 20 points higher than last week, Packard common rose 25 points to 175.

Several of the tire issues were strong though Firestone, which has featured the

Akron exchange with its high price, dropped 40 points. Goodyear featured the market activities with a 25-point rise. Goodrich common rose 2 points; Portage common and preferred went up 10 points each; and U. S. Rubber common and preferred went up 2¼ and ¾ points, respectively.

The Detroit prices were fairly steady with gains ranging from a fraction to 12 points. Packard common featured the activities with a 12-point rise.

White Sued for \$1,500,000

NEW YORK CITY, Oct. 3—Alleging that he had a contract with the White Co., made prior to the outbreak of the European War, giving him the exclusive right to sell White trucks in Russia, M. S. Friede, prominent in Russian-American trade, has filed a suit in this city for damages and commission aggregating \$1,500,000 against that company, which, he states, violated the contract by permitting others to deal in its interest with Russians.

Hall Joins Pathfinder Co.

INDIANAPOLIS, IND., Oct. 2—D. K. Hall last week was appointed director of service of the Pathfinder Co. He had been head of the complaint department of E. C. Atkins & Co., saw manufacturers, Indianapolis, for 20 years.

Chemists Discuss Alcohol as Fuel

NEW YORK CITY, Sept. 29—Alcohol as a possible substitute for gasoline, and its increased industrial value were discussed by chemists attending the National Ex-

Automobile Securities Quotations on the New York and Detroit Exchanges

	1915		1916		Wk's Ch'ge
	Bid	Asked	Bid	Asked	
Ajax Rubber Co.	79	83	64	65½	-½
J. I. Case T. M. Co. pfd.	140	146	145	155	+1
Chalmers Motor Co. com.	98	102	95	99	-1
Chalmers Motor Co. pfd.	..	..	105	106	
*Chandler Motor Car Co.	..	..	198	201	-6
Chevrolet Motor Co.	..	..	40½	42	
Fisher Body Corp.	..	..	97	106	-3
Fish Rubber Co. com.	..	..	110	117	
Fish Rubber Co. 1st pfd.	..	..	100	110	
Fisk Rubber Co. 2d pfd.	..	..	1110	1150	-40
Firestone Tire & Rubber Co. com.	560	..	1110	1150	-40
Firestone Tire & Rubber Co. pfd.	112	..	110	112	
*General Motors Co. com.	348	352	720	759	+20
*General Motors Co. pfd.	111	113	126½	127	+2½
*B. F. Goodrich Co. com.	77	79	74½	75½	+2
*B. F. Goodrich Co. pfd.	109	111	113½	114	+1½
Goodyear Tire & Rubber Co. com.	335	345	295	300	+25
Goodyear Tire & Rubber Co. pfd.	109	110	106½	107½	+1/4
Grant Motor Car Corp.	..	..	9	11	+1
Hupp Motor Car Corp. com.	..	..	5½	6½	-½
Hupp Motor Car Corp. pfd.	..	..	95	..	
International Motor Co. com.	29	30	5	10	
International Motor Co. pfd.	58	63	18	21	+3
*Kelly-Springfield Tire Co. com.	220	227	81½	81½	-1½
*Kelly-Springfield Tire Co. 1st pfd.	89	91	98	100	
*Lee Rubber & Tire Corp.	..	..	45½	46	
*Maxwell Motor Co. com.	53	55	93	93½	-3
*Maxwell Motor Co. 1st pfd.	92	93	87½	88	+½
*Maxwell Motor Co. 2d pfd.	44	45	57	58	-1
Miller Rubber Co. com.	198	202	250	265	
Miller Rubber Co. pfd.	109	110	104	106	
Packard Motor Car Co. com.	126	130	175	185	+25
Packard Motor Car Co. pfd.	100	..	97	102	+2
Paige-Detroit Motor Car Co.	..	..	33½	34½	+1½
Peerless Truck & Motor Corp.	..	..	24½	25½	-1½
Portage Rubber Co. com.	54	56	170	180	+10
Portage Rubber Co. pfd.	92	94	170	180	+10
Regal Motor Car Co. pfd.	..	..	17	22	-1
Reo Motor Truck Co.	18	19	..	..
Rec Motor Car Co.	34½	..	45½	45½	+34
Saxon Motor Car Corp.	..	..	79½	80½	-2½
Springfield Body Corp. com.	..	..	96	100	+14
Springfield Body Corp. pfd.	..	..	125	135	+5

*At close Oct. 2, 1916. Listed New York Stock Exchange. †Ex-dividend. Quotations by John Burnham & Co.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	1915		1916		Wk's Ch'ge
	Bid	Asked	Bid	Asked	
Auto Body Co.	..	..	41	44	+2
Chalmers Motor Co. com.	139	..	145	..	
Chalmers Motor Co. pfd.	97½	102½	102	..	
Continental Motor Co. com.	295	..	36	37	-2½
Continental Motor Co. pfd.	83½	..	9½	10½	
Ford Motor Co. of Canada.	1500	..	325	345	+5
General Motors Co. com.	345	355	700	780	
General Motors Co. pfd.	111	112½	124½	129	+1½
Maxwell Motor Co. com.	53	55	92	95	+1
Maxwell Motor Co. 1st pfd.	90½	93	86½	89½	+3½
Maxwell Motor Co. 2d pfd.	44½	47	56	59	
Packard Motor Car Co. com.	126	..	180	185	+12
Packard Motor Car Co. pfd.	100	..	100	101½	+1½
Paige-Detroit Motor Car Co.	445	36	37½	38	+3½
W. K. Prudden Co.	21	..	51½	..	
Reo Motor Car Co.	35½	..	45½	46	+3½
Studebaker Corp. com.	140	143½	131½	134	+1½
Studebaker Corp. pfd.	106	110	107	..	
C. M. Hall Lamp Co.	..	27	30	..	+3½

INACTIVE STOCKS

Atlas Drop Forge Co.	29	..	33	..
Kelsey Wheel Co.	205	..	55	60
Regal Motor Car Co. pfd.	21	18	..	..

THE AUTOMOBILE

October 5, 1916

position of Chemical Industries in this city.

According to Dr. A. D. Little of Boston, the only fuel in sight which promises to take the place or hold down the price of gasoline is alcohol. Dr. Little declared that alcohol is the best fuel for internal combustion engines, as benzol, which had been suggested as a substitute for gasoline, is not sufficiently plentiful to keep the large number of automobiles in this country going for two days. Kerosene, he added, was out of the question.

From 1912 to 1915 the production of completely denatured and specially denatured alcohol rose from 8,000,000 gal. to 14,000,000 gal. a year.

Alcohol is being made from sawdust, according to A. H. Comey, chemist at the Du Pont Powder Co.'s laboratory, who states that it is a great commercial success and will grow accordingly.

Dr. Little stated that in the yellow pine district alone there is enough material wasted to make 600,000 gal. of alcohol a day.

Industry Gains 153% in 5 Years

1909-1914 Value of Products

\$632,831,000—Gain

\$383,629,000

WASHINGTON, D. C., Oct. 2.—The large growth of the automobile industry in the 5-year period from 1909 to 1914, is indicated by an increase of 153.9 per cent in the value of its products, according to the Census Bureau of the Department of Commerce.

The value of those products in 1914 was \$632,831,000, an increase of \$383,629,000 over 1909. In 1914 there were 300 establishments engaged primarily in the manufacture of automobiles. They employed 91,997 persons, had an invested capital of \$312,876,000, paid \$84,901,000 in salaries and wages during the year and produced vehicles to the value of \$503,230,000.

In addition, there were thirty-three establishments engaged in other lines of manufacturing which produced automobiles to the value of \$6,636,920.

Adding the value of bodies and parts produced by 971 companies making this their principal business and 434 other establishments producing them as a side line, brings the total value of automobile products for that year to \$649,982,990, an increase of 155 per cent over the value of production of \$254,447,346 in 1909.

The greatest increase shown by the industry in the 5 years was in salaries paid, which increased 295 per cent, from \$9,479,000 to \$37,526,000.

The average value of production per employee increased from \$2,920 to \$4,336 in the respective census years.

The second largest increase was in value of materials purchased for the manufacture of cars, bodies and parts. This grew from \$131,646,000 in 1909 to \$356,208,000 in 1914, an increase of 170 per cent.

August Exports Total \$10,068,538 in Value

(Continued from page 557)

valued at \$772,257 and 18,884 passenger cars, valued at \$16,612,060, together with parts to the value of \$4,107,545, were shipped to various foreign countries. These figures look puny beside the statistics for the past 2 years.

Seven hundred and eighty-nine cars, valued at \$1,963,526, were shipped to Russia in August last, while during the 8 months' period of this year the number was 2182 and the value \$5,955,120. Russia did not figure in the export returns last year.

France's contribution to American automobile manufacturers in August last was the purchase of 398 cars, valued at \$1,147,602, which is a big gain over the figures for the same month of 1915, when the purchases amounted to 196 cars, valued at \$661,972. Likewise, during the 8 months' period the shipments to France increased from 4464 cars, valued at \$11,209,798, in 1915, to 6053 cars, valued at \$15,005,294, in 1916.

The big decline is to be noted in the figures for the United Kingdom. In August, 1915, there were 2290 cars shipped to the United Kingdom, the value of which was \$3,530,831, while in August last the number had decreased to 294 and the value to \$534,359. During the 8 months' period the exports fell from 16,784 cars, valued at \$25,528,943, in 1915, to 6575 cars, valued at \$10,392,259, in 1916.

There were no shipments to Germany during August of this year, or during the 8 months' period of 1916, but during the 8 months of 1915 there were four cars valued at \$2,800 exported to Kaiser Wilhelm's domain.

Our trade with Canada shows a large increase during the periods under consideration, the exports having grown from 721 cars, valued at \$480,677, in August, 1915, to 860 cars, valued at \$750,361, in August last, and from 4682 cars, valued at \$3,673,203, to 9476 cars,

valued at \$6,777,656, during the 8 months' periods.

In August a year ago there were 274 cars, valued at \$149,319, shipped to various South American countries, while during the 8 months of that year the number was 1486 cars and the value \$793,037. Herewith are the figures for South American countries, listed separately, for the same periods of this year: Argentina, 145 cars, valued at \$86,470, in August, and 3798 cars, valued at \$1,863,625, during the 8 months. Brazil, 29 cars, valued at \$14,715, in August, and 280 cars, valued at \$184,447 during the 8 months. Chile, 151 cars, valued at \$85,355, and 702 cars, valued at \$446,788; Venezuela, 25 cars, valued at \$19,648, and 386 cars, valued at \$240,982. All other South American countries, 42 cars, valued at \$32,383, and 609 cars, valued at \$367,759. These figures prove conclusively that South America is a field for American-built cars.

Growth of Automobile Industry from 1909 to 1914

	Census			Per Cent of Increase, 1909-1914	1904	Per Cent of Increase, 1904-1908
	Automobiles	Bodies and Parts	Total			
Number of establishments*						
Persons engaged in manufacture:						
Proprietors and firm members.....	300	971	1,271	743	71.1	178
Salaried employees	91,997	53,954	145,951	85,359	71.0	...
Wage earners (average number).....	60	700	760	405	87.7	...
Primary horsepower	12,630	5,469	18,099	9,233	96.0	1,181
Capital	79,307	47,785	127,092	75,721	67.8	12,049
Services:	104,983	68,701	173,684	75,550	129.9	10,109
Salaries	84,901,000	\$94,854,000	\$407,730,000	\$173,837,000	134.5	...
Wages	17,966,000	19,560,000	37,526,000	9,479,000	295.9	\$1,257,000
Materials	66,935,000	34,992,000	101,927,000	48,694,000	109.3	7,159,000
Value of products.....	292,598,000	63,610,000	356,208,000	131,646,000	170.6	580
Value added by manufacture (value of products less cost of materials).....	503,230,000	129,601,000	632,831,000	249,202,000	153.9	30,034,000
	210,632,000	65,991,000	276,623,000	117,556,000	135.3	16,883,000
						596

*In addition, in 1914, 33 establishments primarily engaged in other lines of manufacture, produced automobiles to the value of \$6,636,920, and 434 establishments of this character manufactured automobile bodies and parts to the value of \$10,515,070; in 1909, similar establishments produced automobiles valued at \$830,080 and automobile bodies and parts valued at \$4,415,266.

THE AUTOMOBILE

Speedways Ban Sunday Races

Eight Championship Events of 100 Miles or Over with \$100 a Mile Prizes

NEW YORK CITY, Oct. 2—Practically all of the speedways were represented at a joint meeting of the contest board at the American Automobile Association in this city to-day, when changes in the racing rules for 1917 were discussed and other necessary changes for 1917 racing recommended.

All speedways were agreed that the contest board should not sanction Sunday racing on speedways. Indianapolis, represented by J. N. Allison, was particularly strong on this ruling, due to the postponed race on the Chicago speedway being held on a Sunday, which caused the withdrawal of the Indianapolis team. David S. Reid, representing the Chicago speedway, voted for the new rule.

It was decided that eight 1917 championship events be held, one on each speedway. These championships are to be at a minimum of 100 miles, but may be at 250, 300, 350 or 500, according to the desires of the different speedways. It was voted to have a minimum cash prize at the rate of \$100 per mile of race. This would make the prize for a 500-mile race \$50,000; for a 250-mile race, \$25,000, and for a 300-mile race, \$30,000.

The eight championship events scheduled for 1917 are:

May 30.....	Indianapolis
June 9.....	Chicago
July 4.....	Omaha
July 14.....	Des Moines
July 28.....	Tacoma
Sept. 3.....	Cincinnati
Sept. 15.....	Providence
Sept. 29.....	New York

In addition to this schedule of championship events which are only to be held on speedways, 1917 dates for other speedway races were arranged for as follows:

May 19.....	New York Metropolitan
June 23.....	Cincinnati
Aug. 4.....	Kansas City
Oct. 6.....	Kansas City
Oct. 13.....	Chicago
Oct. 27.....	New York

It is expected that early next year two other speedways will be completed, namely, Philadelphia and Uniontown. Dates will have to be awarded for these as necessary.

The feeling was general that all drivers who qualify and start in 1917 races should receive some financial assistance, and it was decided to allow \$100 transportation expenses to all cars qualifying and starting. Should a car finish in the money this amount would be deducted from the cash winnings of the car. If the car does not finish in the money the \$100 will be awarded. In case of particularly long trips, such as Chi-

cago to Tacoma, a total allowance of \$150 per car may be made.

No 1917 championships will be held outside of the speedways as mentioned. This year the Grand Prize and Vanderbilt Cup races will be included in the championship events. It was decided to allow the first 300-cu.-in. car finishing in each of these 1916 road events to receive championship points the same as if they won the event. In other words, the first 300-cu.-in. car to finish will receive 800 points, the second 420, the third 220, etc.

Drivers will be better protected in 1917, in regard to receiving prize money, than they were this year. At Minneapolis and Sioux City drivers were required to compromise and did not get their full cash allowance. For 1917 cash prizes must be posted 2 weeks before the day of the race. This protects every driver and he will not be put to the expense of shipping his car to a speedway, because he will know before he has to ship if the money is posted or not.

New Starting Rules

While the drivers have been given every assistance under the new schedule, there are a few rules which they will have to observe. One of these is that every driver must be at the starting line 1 hr. before the start of the race. Violation will mean a cash penalty.

Pit supplies for racing cars must be in the pits at least 3 hr. before the start of the race.

Eddie Rickenbacker recommended that on speedways like New York and Chicago forty cars be permitted to start instead of thirty-two. It is expected that the contest board will revise its rules accordingly.

The drivers winning positions in the 1916 championships will receive permanent racing numbers for their cars in 1917 according to the positions in which they finished in the 1916 championships. Thus the driver finishing first in the 1916 championship will have No. 1 for his car during the entire racing season. He will also be given No. 1 driver's registration. The driver finishing second will be given No. 2 racing number for his car and also No. 2 driver's registration. This rule was strongly urged by the drivers.

To Boost Championship Fund

In order to swell the championship fund for 1917 the different speedways have agreed to pay to the contest board \$10 for each car entered in a championship event. This money will all go to the 1917 championship fund.

Among those speedways represented at the meeting were: Indianapolis, J. M. Allison and L. E. Myers; New York, Harry Harkness and E. Thompson; Chicago, David E. Reid and Edward Heinze; Cincinnati, H. S. Lehman; Uniontown, C. W. Johnson; Des Moines, L. C. Dunn; Omaha, J. W. McShane.

Aitken Leads for Championship

Astor Cup Victory Lifts His Score to 2520 Points—Resta Second

NEW YORK CITY, Oct. 2—Johnny Aitken, of the Indianapolis speedway racing team, now leads the list in the 1916 racing championships. Aitken was running third previous to the Astor Cup race Saturday, but by winning this race he gained 800 points and so took first position away from Dario Resta, who was leading with 2400 points. Aitken now has 2520 points to his credit.

The order of championship standing is:

J. Aitken.....	2,520	Le Cain.....	120
Dario Resta.....	2,400	B. Oldfield.....	80
E. Rickenbacker.....	1,990	O. Taft.....	75
Ralph De Palma.....	1,790	E. Pullen.....	70
D'Alene.....	1,120	O. Haibe.....	60
Milton.....	690	N. Stringer.....	55
Mulford.....	620	G. Adams.....	55
Christiaens.....	540	Earl Cooper.....	55
Henderson.....	517	H. Wilcox.....	40
Vall.....	440	W. Chandler.....	40
D. Lewis.....	380	P. Watson.....	35
F. Galvin.....	340	M. Sorensen.....	35
J. Devigne.....	320	C. Johnson.....	30
H. Hughes.....	275	J. Gable.....	30
G. Buzane.....	210	Devene.....	30
E. O'Donnell.....	185	F. McCarthy.....	25
C. J. Devlin.....	140	W. J. Muller.....	20
A. A. Klein.....	125		

Uniontown's 1½-Mile Speedway to Open Thanksgiving Day

NEW YORK CITY, Oct. 3—The new Uniontown, Pa., 1½ mile board speedway, which has been erected by C. W. Johnson, a Uniontown capitalist, will be opened on Thanksgiving Day for the local meet. The speedway is a regulation board type, designed and built by Jack Prince of bicycle fame.

Speedway Heads Meet and Discuss Permanent Organization

NEW YORK CITY, Oct. 3—Steps toward a permanent organization of the different motor speedways were taken here to-day when representatives of Indianapolis, New York, Chicago and Cincinnati speedways discussed tentative plans for the scope of such an organization. To-day's meeting adjourned to meet in Chicago on Saturday, Oct. 14, when a charter for such an organization will be adopted.

The committee in charge consists of L. E. Myers, Indianapolis; David A. Reid, Chicago; E. Thompson, New York, and H. Lehman, Cincinnati. These four are taking the old Indianapolis charter for such an organization, and re-arranging it to meet present conditions. R. Kennerdell, chairman of the Contest Board, A.A.A., will meet with the committee in Chicago.

31 Grand American Entries

CHICAGO, ILL., Oct. 4—The management of the Chicago speedway has announced thirty-one entries for the Grand

American automobile race, Oct. 14. This is for 250 miles and is limited to 300-cu.-in. cars, being an A. A. A. championship event.

Aprahamion Sails for Orient

NEW YORK CITY, Oct. 4—A. Aprahamion sails Saturday for Africa, China and other points in the Far East, where he will represent several automobile and accessory companies, among which are: Mitchell Motors, Federal Tire, Cox Brass, New Departure, Standard Woven Fabric, Champion and Keyless Auto Lock. Mr. Aprahamion recently returned from South America.

Hupmobile Tour Progressing Westward

DETROIT, MICH., Oct. 2—The capital-to-capital Hupmobile left Minneapolis on its way westward, with Pierre, S. D., for its next destination. From Pierre it goes to Seattle, Wash. The car turned the 5000-mile mark between Des Moines and Minneapolis exactly on the thirtieth day of its trip, Sept. 28. On that same day the crew encountered the first rain-storm and drove in mud to the hubs.

New Traffic Plan for New York

NEW YORK CITY, Sept. 30—Isles of safety are now put at the intersections of Fifth Avenue with 43rd, 46th and each alternate cross street as far north as 59th to help solve the night traffic problem due to the increased vehicle travel caused by the street car strike. These isles of safety render it possible to withdraw traffic policemen from these points.

Eastman Heads Philadelphia Packard

PHILADELPHIA, PA., Sept. 30—Lee J. Eastman, manager of the Philadelphia branch of the Packard Motor Car Co., was elected president by the directors at a recent meeting in Detroit, succeeding Edwin B. Jackson, who is now president of the New York branch.

Harkness Trophy Race Oct. 28

100-Mile Event Will Carry \$10,000 Prize Money—Marks Close of 1916 Season

NEW YORK CITY, Sept. 30—The 100-mile race for the Harkness trophy will be held at the Sheepshead Bay Speedway Oct. 28. It will also carry \$10,000 prize money. The Harkness trophy race is looked upon as the final speedway event of the year and is expected to bring together all the drivers who have won places in the big races of the season.

The first Harkness trophy race last year was won by Dario Resta in his Peugeot in 56:55:71 or at 105.39 m.p.h.

Silver Takes Dort in New York

NEW YORK CITY, Sept. 30—C. T. Silver has closed a contract with the Dort Motor Car Co., Flint, Mich., by which he will represent the Dort car in the New York territory.

Oakland Branch Managers in 3-Day Conference at Plant

PONTIAC, MICH., Sept. 30—The 3-day annual meeting of the branch managers, distributors and salesmen of the Oakland Motor Car Co., ended to-day. It was the most enthusiastic gathering of Oakland salesmen ever held, marking the most successful year in the history of the company.

Oakland officials, branch managers and distributors took part in the many business sessions at which all matters concerning the 1917 Oakland policies as to cars, service, sales, etc., were discussed. The visitors also spent considerable time in the shops.

A banquet was tendered to the visiting

Oakland men by the officials of the Oakland Motor Car Co., at the Hotel Statler, Detroit, Sept. 29. Among those who informally addressed the distributors and salesmen were Fred W. Warner, now president of the company; C. B. Voorhis, now vice-president; J. T. Shaw, treasurer of the General Motors Co.; W. L. Day of the General Motors Truck Co.; H. H. Rice, personal representative of W. C. Durant; Carl M. Green and W. C. Durant, who came unexpectedly.

Takes Over N. Y. Saxon Factory Branch

NEW YORK CITY, Oct. 1—Distribution of the Saxon in this city and surrounding territory, formerly in the hands of a factory branch, has been taken over by the Saxon Motor Car Corp., recently organized. G. S. Morrow is president.

Newman Resumes Former Position

DETROIT, MICH., Oct. 4—Harry Newman, who recently resigned the presidency of Harry Newman, Inc., Chicago and Milwaukee Chalmers distributors, has again taken his old position.

Lancia Adopts H. & N. Carburetor

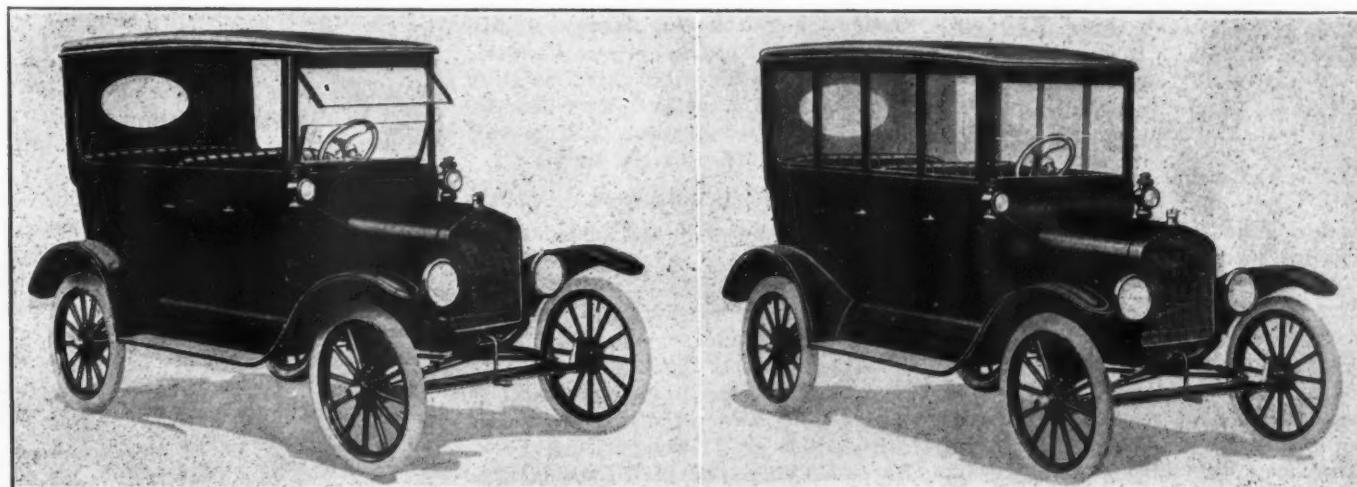
NEW YORK CITY, Sept. 30—The Lancia Co. has adopted the H. & N. carburetor as standard equipment, the type used being of special design for this car.

Lexington-Howard Rayfield Equipped

CONNERSVILLE, IND., Oct. 3—The Lexington-Howard Co., this city, has added the Rayfield carburetor as standard equipment.

Senator Morgan to Sell Saxons

NEW YORK CITY, Oct. 4—W. J. Morgan, familiarly known as "Senator," and pioneer in automobile beach races in Florida, has organized the Morgan-Farr Motor Co., Inc., Newark, N. J., to sell Saxon cars.



The Motor Products Co., Indianapolis, Ind., has commenced manufacture of the convertible sedan top for Ford cars illustrated above. It is easily attached in the first instance, and the windows can afterward be removed quickly in fair weather or replaced for bad conditions. It is supplied for \$125. This is the first of a series that will be put on the market; tops of similar design for Chevrolets, Overlands, Maxwells, etc., will be added shortly.

Factory Miscellany

Brown Heat Department Completed—The Brown Co., Syracuse, N. Y. has been completed. Four oil-burning furnaces have been installed with a capacity of sixteen large pots per furnace, or 1200 to 1600 bolts per heat, each furnace. Three heats every 24 hr. can be successfully run, or 3600 to 4800 pieces for each furnace in a complete day.

Bulldog Plant for Plymouth—Adelbert Work, of Chicago, head of a company manufacturing Bulldog shock absorbers and other accessories, has announced plans for removing the plant from Chicago to Plymouth, Ind., as soon as a factory building can be erected. Ground for the plant has been purchased. The plant will be 38 by 38 feet.

Patent Ring Plant—The Ford-Davis Mfg. Co., St. Louis, has selected 2642 Locust Street as the location for the new factory and will manufacture the Ga-Saver piston rings, of which Jack Ford and T. D. Davis, the active members of the firm, are inventors.

American Tire Fabric Company Builds—The American Tire Fabric Company, New Bedford, Mass., will start work soon on a 76 by 194-ft. two-story factory.

1250 Men Erecting Goodyear Buildings—The Goodyear Tire & Rubber Co., Akron, Ohio, is employing 1250 men in the erection of its new buildings. Goodyear building operations now include more room for the office force as well as the

factory workers. Within a year the company expects to be employing 20,000 men, making Goodyear products.

Boone Tire to Build in Belvidere—The Boone Tire & Rubber Co. has secured an option on ten lots in Belvidere, Ill., on which it will erect a plant in two units, the first of which will be housed in a building 60 by 120 ft., in which machinery will be installed for manufacturing fifty tires a day. Immediately upon the completion of this unit two additional buildings will be erected. The complete plant will have a capacity of from 150 to 200 tires per 10-hr. day.

1000 Sets of Hayes Wheels in Day—The Hayes Wheel Company recently built 1000 sets of Ford wheels in one day at its Anderson, Ind., plant. The 4000 wheels were produced by the regular force of 300 men running day turn. A night shift of 300 employes is to be added so that the required capacity of 2000 sets of Ford wheels daily may be reached.

Cadillac Truck Plant Completed—The foundation work and the first floor of the new plant of the Cadillac Auto Truck Company, Cadillac, Mich., is completed. The structure is two stories high, 100 by 180 ft. It will be occupied Nov. 15.

Mitchell Rushed—The demand of the Mitchell Motors Company on the Mitchell Wagon Company, both of Racine, Wis., for automobile bodies, has necessitated

the wagon company increasing its working force as well as the provision of additional room for the automobile body department.

Budd Company Adds—The Edward G. Budd Manufacturing Company, Philadelphia, Pa., maker of steel automobile bodies, etc., has awarded a contract for the electrical equipment for its recent plant additions at an estimated cost of \$20,000.

Spokane Lumber Company Makes Bodies—The Robbins Lumber Company, Spokane, Wash., is planning a four-story addition to its plant at 1218 Railroad Avenue, where it manufactures bodies for automobiles. The addition will be 16 by 30 ft., of concrete and brick.

Advance Felt Moves—The Advance Felt Specialty & Cutting Co., Chicago, has moved into its new quarters at 318-322 South Jefferson Street. This is the second move for the company within the last eighteen months, due entirely to the rapid growth of the business. The new building is of the "daylight" type, two stories with full concrete basement, brick construction with sprinkler system, equipped throughout with specially designed machinery for the cutting, stripping and punching of felt cloth, rubber, and analogous materials. The Advance people specialize in the manufacture of felt parts for automobiles, motors, transmissions, axles, etc.

The Automobile Calendar

ASSOCIATIONS

- Oct. 2-5—St. Louis, Fall Meeting Assn. of Automobile Accessory Jobbers.
- Oct. 2-7—Kansas City, Mo., Dealers' Show, American Royal Live Stock Show; Kansas City M. C. Dealers' Assn.
- Oct. 12—Flint, Mich., Fall Meeting National Assn. of Automobile Accessory Jobbers.
- Dec. 2-9—Electricians' Country-wide Celebration.
- Jan. 9-11—New York City, Society of Automobile Engineers Mid-Winter meeting, Thursday, Jan. 11, S. A. E. day. Annual Banquet, Hotel Biltmore, Special performance Ziegfeld's Midnight Follies.

CONTESTS

- Oct. 7—Omaha Speedway Race.
- Oct. 7-14—Troy, N. Y., Show, Motor Mart Bldg.
- Oct. 14—Chicago Speedway Race.
- Oct. 19—Indianapolis, Ind., Race, Indianapolis Motor Speedway.
- Oct. 21—Kalamazoo, Mich., Track Races, Kalamazoo, Motor Speedway.
- Oct. 22-23—Los Angeles, Cal., Commercial Car Reliability Tour.

Nov. 16 and 18—Santa Monica, Cal., Vanderbilt Cup and Grand Prix Races.

Nov. 18—Phoenix, Ariz., 100-mile free-for-all Track Race, Arizona State Fair.

1917

April—Los Angeles to Salt Lake City Road Race.

May 19—New York Metropolitan Race on Sheepshead Bay Speedway.

May 30—Indianapolis Speedway Race, Championship.

June 9—Chicago, Ill., Speedway Race, Championship.

June 23—Cincinnati, Ohio, Speedway Race.

July 4—Omaha, Neb., Speedway Race, Championship.

July 14—Des Moines, Iowa, Speedway Race, Championship.

July 28—Tacoma, Wash., Speedway Race, Championship.

Aug. 4—Kansas City Speedway Race.

Sept. 3—Cincinnati, Ohio, Speedway Race, Championship.

Sept. 15—Providence, R. I., Speedway Race, Championship.

Sept. 29—New York, Speedway Race, Championship.

Oct. 6—Kansas City Speedway Race.

Oct. 13—Chicago Speedway Race.

Oct. 27—New York Speedway Race.

SHOWS

Oct. 6-11—St. Louis, Mo., Open Week, Dealers' Assn.

Oct. 9—Kansas City, Mo., Fourth Annual Trade and Booster Tours, Kansas City Motor Car Dealers' Assn.

Oct. 14-21—Pittsburgh, Pa., Thirteenth Annual Show, Motor Square Garden, Automobile Dealers' Assn. of Pittsburgh.

Oct. 14-21—Dallas, Texas, Show, State Fair.

Nov.—Providence, R. I., Show, Rhode Island Automobile Dealers' Assn.

Dec. 2-9—Springfield, Mass., Show, Auditorium. H. W. Stacey, Mgr.

Dec. 30-Jan. 6—Cleveland, Ohio, Sixteenth Annual Show, Wigmore Coliseum, Cleveland Automobile Club.

Jan.—First Pan-American Aeronaute Exposition, New York City: Aero Club of America, American Society of Aeronaute Engineers, Pan-American Aeronaute Federations.

Jan. 6-13, 1917—New York City, Show, Grand Central Palace, National Automobile Chamber of Commerce.

Jan. 13-20—Montreal, Que., Show, Montreal Automobile Trade Assn.

Jan. 20-27—Montreal, Que., Automobile Trade Assn.

Jan. 27-Feb. 3, 1917—Chicago, Ill., Show, Coliseum, National Automobile Chamber of Commerce.

Feb.—Newark, N. J., Show, First Regiment Armory.

Feb.—Minneapolis, Minn., Show, National Lamp Co. Factory.

Feb. 10-18—San Francisco, Cal., Pacific Automobile Show, G. A. Wahigreen, Mgr.

Feb. 18-25—St. Louis, Mo., Show, Auto Manufacturers' and Dealers' Assn.

Feb. 3-10—Minneapolis, Minn., Show, Minneapolis Automobile Trade Assn.

Feb. 26-March 3—Omaha, Neb., Show, Auditorium, Omaha Automobile Show Assn.

March 3-10—Boston, Mass., Show, Mechanics' Bldg., Boston Automobile Dealers' Assn.

March 6-10—Ft. Dodge, Iowa, Northern Iowa Show, New Terminal Warehouse, G. W. Tremain, Secretary.

TRACTOR

Oct. 14-29—Dallas, Tex., Demonstration, Texas State Fair.

The Week in the Industry



Twin City News—The Chevrolet Motor Co. and the Bearings Service Co., Minneapolis, will occupy a new building on Harmon Place near Hennepin Avenue.

The St. Paul Chandler Co. has been formed to sell Chandlers and R. W. Panter will be sales manager.

The Overland Co. has shipped from the factory branch in St. Paul forty-two car-loads of stock cars to Vladivostock, Russia, for use of the government. The shipment, 126 machines, valued at \$150,000, left recently for Seattle.

Washington Items—George Farnsworth, Seattle, Wash., has opened sales-rooms at Broadway and Pine Street, where he will distribute Abbott-Detroit machines for the territory of Washington, Oregon and northern Idaho.

The Stegeman motor truck has entered the Northwest field, the F. H. Barshar Motor Co. having secured the distribution, with headquarters in Seattle.

M. C. Davies has secured the exclusive agency in Tacoma and Pierce County for the Velie line.

R. A. Mueller and L. W. Harkins have withdrawn from the Universal Motor Co. in Tacoma, and have formed the Mueller-Harkins Motor Co. to distribute Buick cars and G. M. C. trucks in Pierce County.

The Chevrolet Northwest Co. has opened a branch in Tacoma with a complete line of parts and accessories, with A. J. Smith as director of sales.

Ohio News Items—The Central Auto Vehicle Co., Columbus, has taken the central Ohio agency for the Grant, formerly held by the Miller-Main Garage.

Harry Ensign has purchased the interest of his brother, Bert Ensign, in the Ensign Motor Co., Springfield, agent for the Cadillac and Cole.

The Dobyns Motor Car Co., Hilliard, has taken the agency for the Chalmers, covering all of the counties of Union, Madison and Delaware. Branch sales-rooms will be opened in London, Marysville, Delaware and Plain City.

Geddes with Scripps-Booth—B. F. Geddes has been appointed sales representative in the Middle West for Scripps-Booth Co. He was formerly with the Grant and Maxwell companies.

Niekirk with Galion Truck Co.—J. D. Niekirk, foreman at the plant of the Sommer Motor Co., Bucyrus, Ohio, has resigned to become shop superintendent of the Galion Dynamic Motor Truck Co.

Willis Joins Singleton-Hunting Co.—P. P. Willis has joined the Singleton-Hunting Co., Cleveland, Ohio, advertising

agent, as vice-president and manager of production. James P. Hunting becomes treasurer and continues in charge of merchandising. These changes were rendered necessary by the increasing automobile accessory business of the company.

Rennard Joins Ross—Ben Rennard has been appointed special sales representative for the Ross Automobile Co., Detroit. He has been with the Locomobile, Chalmers and Chandler organizations.

Zadek Goes to Temple Co.—James L. Zadek, superintendent of the police department shops, Chicago, Ill., has resigned to take charge of the testing and assembling departments of the Temple Mfg. Co., 54th and 22d Streets. The Temple company makes gasoline engines and machine tools.

Diver to Design Cole Bodies.—B. M. Diver, body designer and engineer, has become connected with the Cole Motor Car Co., Indianapolis, Ind. Mr. Diver's special work is in connection with the present Cole-Springfield bodies and he will devote his attention to other bodies now contemplated.

Gilbreath Detroit Club Mgr.—William Sydnor Gilbreath has resigned as traveling secretary of the Dixie Highway Association to become manager of the new Detroit Automobile Club. Mr. Gilbreath has been one of the best-known figures in the development of through routes in America, having been associated with Carl Fisher in the early days of the Lincoln Highway, and after the preliminary work on that was done carrying forward similar work for the Dixie Highway Association.

Williams with Chanslor & Lyon.—Harric R. Williams has resigned as accessory sales manager of the Gibson Co., Indiana Overland distributor, to become vice-president and general manager of the Chanslor & Lyon Co., San Francisco, accessory dealer and distributor. He will be succeeded by E. C. Kurman, manager of the Gibson Co.'s branch at Logansport, Ind.

\$600,000 Chevrolet Co. in Texas.—The Chevrolet Motor Co. of Fort Worth, Tex., was chartered this week with a capital stock of \$600,000. Incorporators are W. C. Stripling, Sam Davidson and B. C. Bradford of Fort Worth and W. C. Durant of New York.

Johnson, Tractor Expert, Sails for Russia.—Nelson Johnson, tractor expert for the Emerson-Brantingham Co., Rockford, Ill., sailed this week for Vladivost-

tock, Russia, to line up business for delivery after the war. Johnson has spent several years in Spain, Argentina and Mexico, selling tractors, and will remain in Russia for a year or more, being similarly engaged.

Gibson and Hammerton Resign.—Lester H. Gibson, formerly general manager of the Gibson-Hollister Mfg. Co., Boston, Mass., and Alfred J. Hammerton, formerly superintendent, have resigned to become connected with the Higginson-Gibson Mfg. Company, Inc. This concern makes automobile electric lamp connectors and other accessories.

Chandler's N. Y. Office Moved.—W. S. M. Mead, vice-president of the Chandler Motor Car Co., Cleveland, Ohio, and in charge of exports, has moved his offices from the Brady-Murray Motors Co., Chandler distributor in New York City, to 1790 Broadway.

Picard Moves.—A. J. Picard & Co., New York City, accessory dealer, has outgrown the present quarters at 1720 Broadway, and will build a five-story building at Sixty-first Street to be finished around Jan. 1.

Ryall Joins Poertner.—J. B. Ryall, prominent in automobile racing a few years ago, has been appointed manager of the Poertner Motor Car Co.'s truck department, New York City.

Gewinner Resigns.—J. K. Gewinner has resigned as president and general manager of the Johnson-Gewinner Company, Atlanta, Ga., accessory dealer.

Bulask Joins Frisco Company.—H. C. Bulask has joined the Hartmann Motor Sales Agency, San Francisco, in the capacity of wholesale manager for the Elgin Six. This company also handles the Lozier and Paige.

Philadelphia Items—The Pratt & Moser Motor Co., Fifty-seventh and Chestnut Streets, has opened a showroom and service station at 833 North Broad Street, and will handle the Pilot and Elcar automobiles.

The L. S. Bowers Co., 245-47 North Broad Street, agent for the Cole and Grant cars, has opened a used-car department across the street, at 256.

The W. Clark Grieb Co., Briscoe agent in this territory, has moved to its new salesroom and service station, 851 North Broad Street.

Gaulke Joins Heil.—W. H. Gaulke has resigned from the A. B. and B. Specialty Company to join the Heil Company, Milwaukee, Wis., in charge of the automobile gasoline tanks and specialties.